

O-Level Geography Notes

Pakistan Studies Paper 2

5th Edition

(2023)

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Title	O-Level Geography Notes
Author	Dr Iftikhar-UI-Haq (0333-4257013)
Published by	MS Books (042-35774780)
Legal Advisor	Ashir Najeeb Khan (Advocate High Court) AKBAR LAW CHAMBERS 39-40, 1 st Floor, Sadiq Plaza, The Mall, Lahore 042-36314839, 0307-4299886
For Complaints/Order	MS Books 83-BI Ghalib Market, Gulberg III Lahore (042-35774780), (03334504507), (03334548651)
Price	850/-

Preface

My " O Level Notes on Islamiyat and Pakistan Studies " are the result of my rich teaching experience, my constant interaction with the CIE and the results of my brilliant students many of whom managed to be enlisted among the HIGH ACHIEVERS/DISTINCTION HOLDERS in both the subjects. These notes will be updated every year in view of the changes in the style and content of the questions in the CIE examinations. Soon some sort of " Practice Books" will also be published to make these subjects as interesting as possible.

Almost all the topics have been covered in Question-Answer format so that students may not only learn these answers but also feel their thinking skills stimulated that will induce curiosity and minimize the element of rote learning.

When students are capable of "making "new questions, I feel my mission accomplished.

Students as well as teachers should feel free in contacting me as and when required.

Wishing all my students best and praying for their excellent grades.

Good Luck

Dr. Iftikhar-ul - Haq



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Pakistan Studies Paper 2

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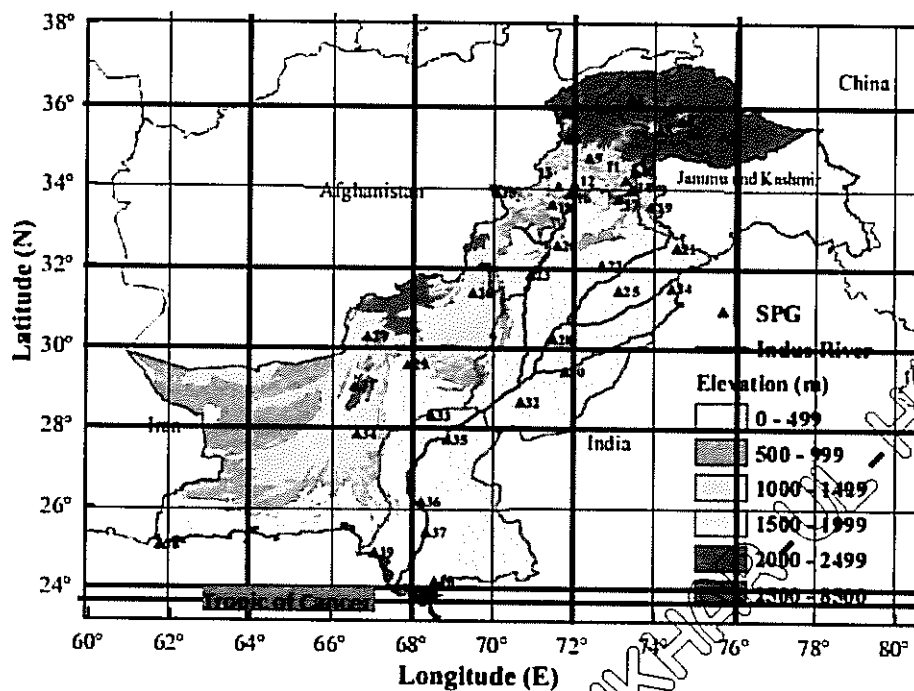
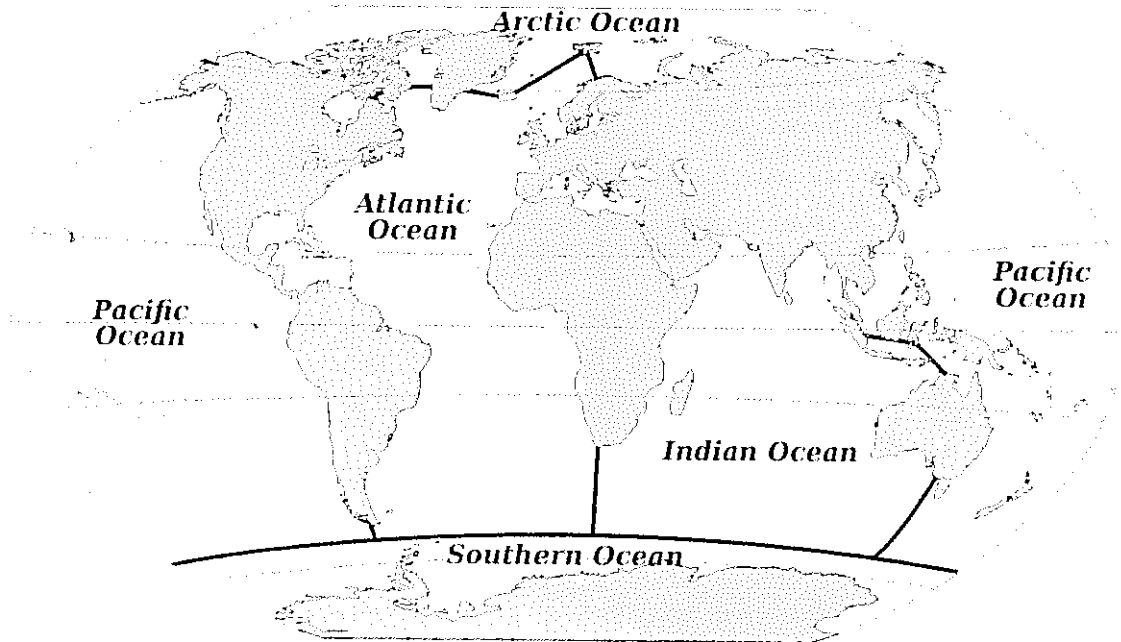
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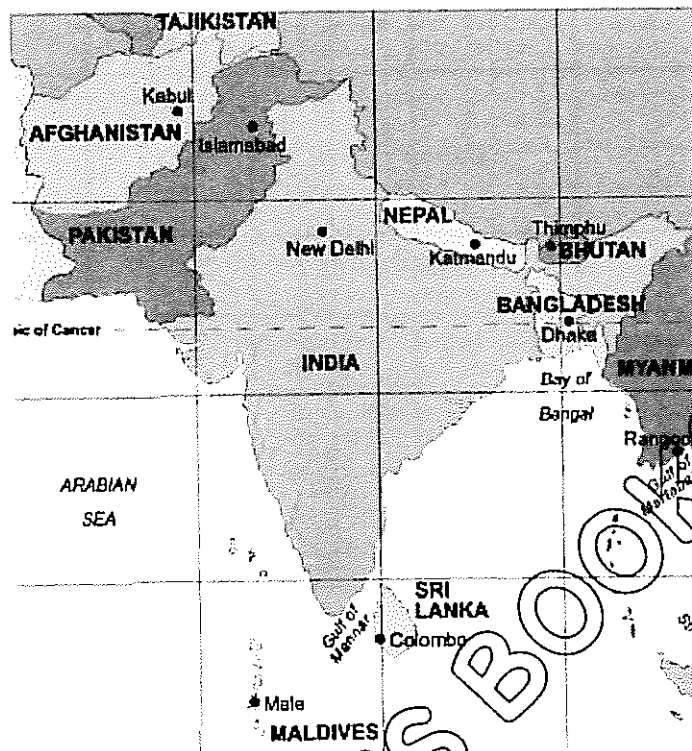


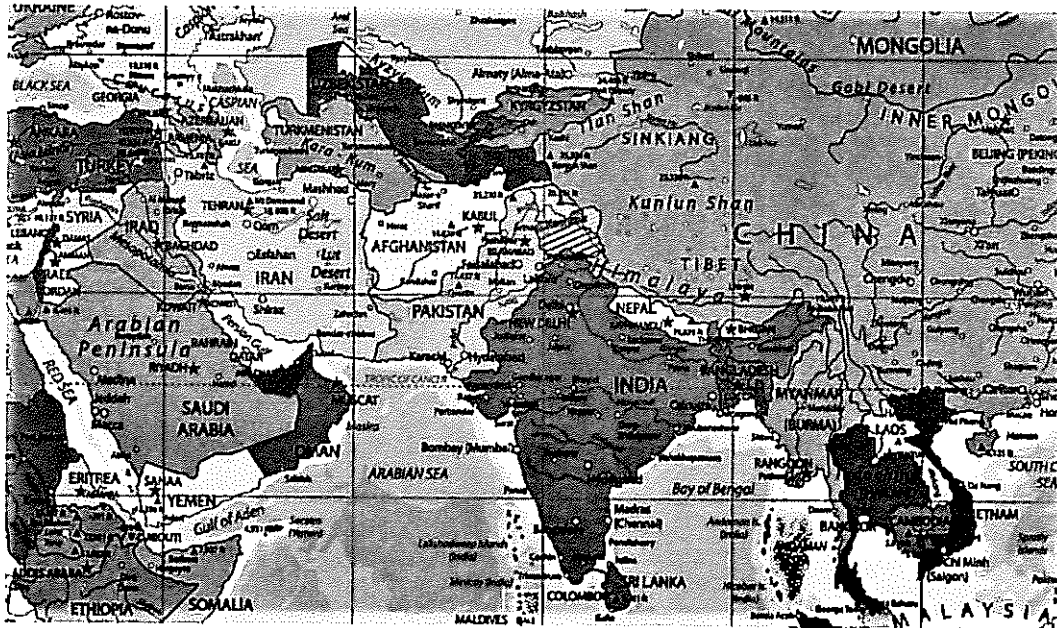
CHAPTER 01

LAND OF PAKISTAN

Location of Pakistan:





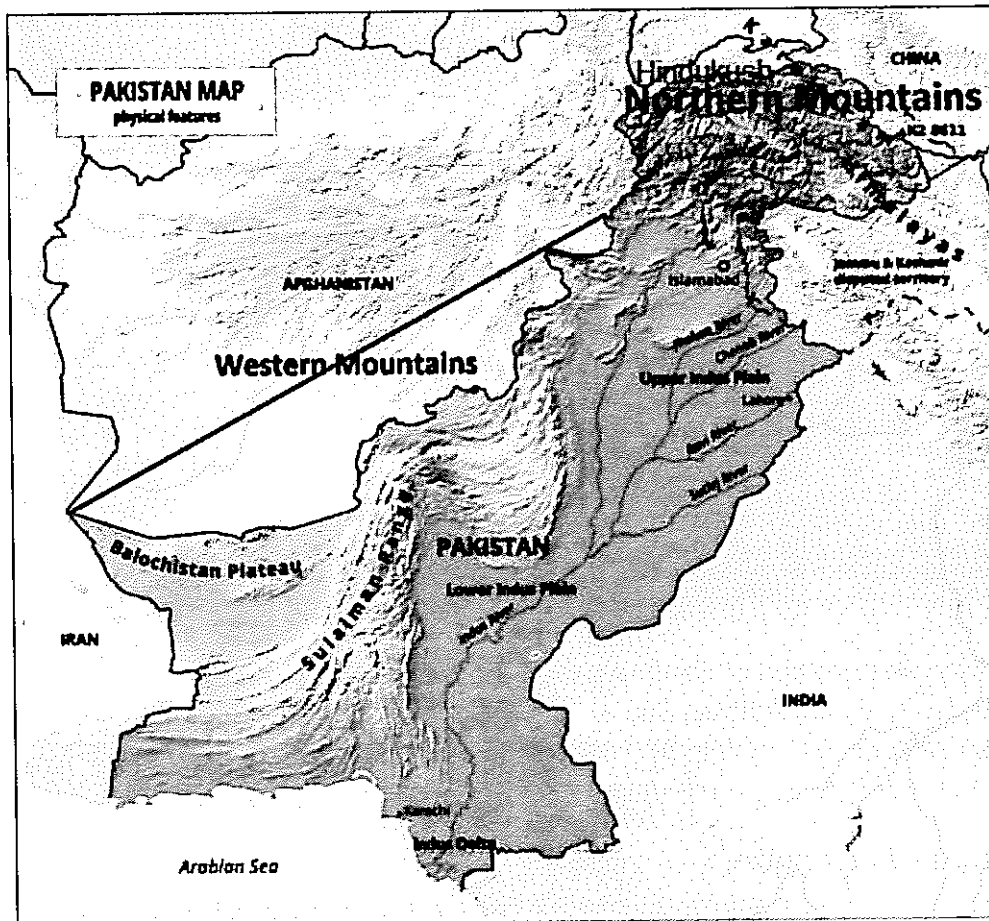


- On the western end of South Asia; on the east, India; north China; NW, Afghanistan; west, Iran; south, Arabian Sea
- From latitude $24^{\circ} 35' N$ to $37^{\circ} 05' N$; longitudes $61^{\circ} E$ to $78^{\circ} E$
- 1600 km N to S; 885 km E to W.

Importance of Location

- Connected to: Afghanistan by historic passes e.g., Khyber and Khojak; a narrow strip of Wakhan (Afghanistan) separates it from Central Asia (Tajikistan)
- China through the Khunjerab Pass (KKH)
- Iran by road and rail routes
- India by road and rail routes.
- Pak's coast between the Middle East and Far East + SE Asia
- Karachi airport also at central position
- 1992 onwards, opportunity to provide transit trade to the landlocked CAR's (Central Asian Republics), on the pattern of the ATTA (Afghan Transit Trade Agreement).
- Huge deposits of power resources in CAR's can be of great help to Pakistan.
- Bilateral trade with China and Iran also important for Pakistan, especially after the start of CPEC (China-Pakistan Economic Corridor).

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Landforms of Pakistan

Topography: study of surface features of land (e.g. rugged, flat, badland)

Drainage: water channels (rivers, lakes, streams) passing through/draining an area.

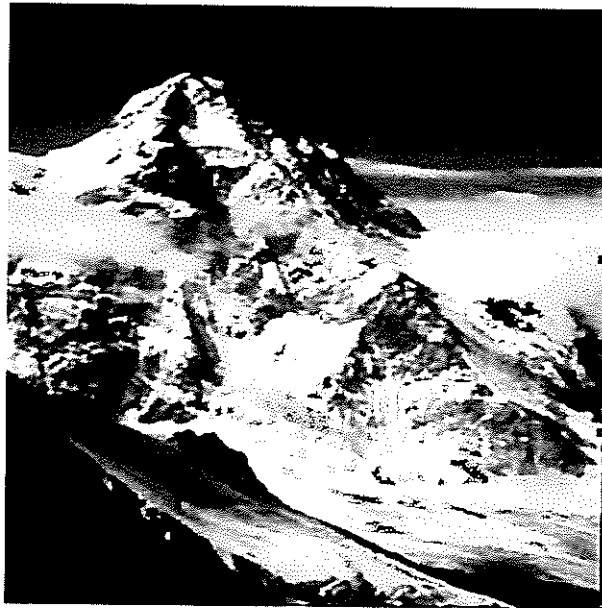
Two main natural topographic divisions:

1. Western highlands: N (Northern) and W (Western) mountains, the Balochistan plateau, Potwar plateau and salt range.
2. The Indus Plain/floodplains—UIP (Upper Indus Plain), LIP (Lower Indus Plain), Tidal/Indus Delta, Desert plains and Piedmont plains.

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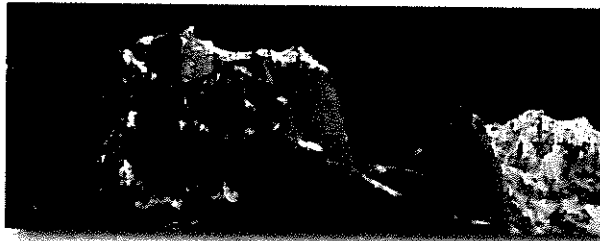
Western Highlands

(1) Northern (and north-western) mountains:



Karakoram Range in Pakistan

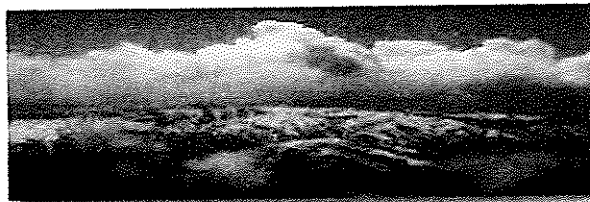
Karakoram means black stone, it is believed to be the north western extension of greater Himalayan mountain system, covering the borders between Pakistan, India and China, in the regions of Gilgit-Baltistan (Pakistan), Ladakh (India), and Xinjiang region, (China).



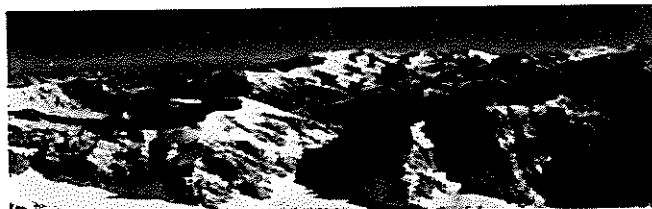
The range is about 500 km (311 mile) in length, and is bounded on the northeast by the edge of the Tibetan Plateau, and on the Karakoram Rangenorth by the Pamir Mountains. The southern boundary of the Karakoram is formed, west to east, by the Gilgit, Indus, and Shyok Rivers, which separate the range from the north-western end of the Himalaya range.

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Hindu Kush Range In Pakistan



In the north-west there is a mountain range called Hindu Kush. Most parts of the high Hindu Kush range (Eastern Hindu Kush range), are located in northern Pakistan and Afghanistan. This range is also present in Ghizar, Yasin Valley, and Ishkoman in Pakistan's Northern Areas. Tirich Mir, located in Chitral (25,289 ft) is the highest point in the Hindu Kush range.



Page 1 of 25

- Karakoram, Hindukush, Himalayas and Dir, Kohistan and Swat ranges, across the north of Pak.
- Himalayas further subdivided into: the Siwaliks/lower, lesser/outer and greater Himalayas

Natural Topography:

- Stretch across north of Pak, run E to W
- Parallel ranges, average height 4000-7000m (K-2 highest, 8475m) with decreasing height N to S
- Steep slopes, snow-capped peaks, high narrow passes, snow fields/glaciation features, deep valleys (Dasu Patan 6500m) in the Himalayas.
- Deo Sai Plateau, one of the world's highest plateaus, also located here.

Glaciation features:

- Snow fields are plains covered permanently with snow/ice above the snowline (4500m or above)
- Serrated landscape (series of peaks appearing as dentitions and used for agriculture)
- Bare rocks (devoid of vegetation due to height above snowline)
- Scree or loose rock debris accumulated at foothill
- Deep V-shaped valleys or gorges (steep sided valleys)
- U-shaped valleys due to moving glaciers

- Deeply dissected terrain, also due to movement of glaciers
- Cirques/Corries: steep walled basins (shallow areas) due to glacial action; e.g., Lake Siaf-ul-Muluk in Kaghan valley and Lake Satpara near Skardu.

Glacial action:

- While moving, glaciers cause: (i) erosion, both as abrasion and plucking (ii) transportation of their load and (iii) deposition of their load at a new place.
- Abrasion is the scrapping of the surface by rocks frozen into the moving ice
- Plucking occurs when ice is frozen on the rock surface and pulls off rock pieces as it moves again.
- Some major glaciers: Siachin, Batura, Baltoro
- Important valleys: Kaghan, Hunza, Baltistan, Murree and Galiat.

Drainage of Northern Mountains

- Indus and some other rivers as well as some lakes are the dominant drainage features
- Indus originates from Lake Mansrowar, Tibet in China, is joined by River Swat, Indus itself joins river Kabul at Attock
- Forms deep valleys and gorges in its course, takes a southern turn at Kalabagh to enter the Indus plain.
- In N. mountains, many tributaries of Indus also provide drainage, e.g., rivers Gilgit, Hunza; several rocks eroded by rivers flowing downhill, waterfalls (steeply falling water), rapids (a series of waterfalls), streams and springs (water of melting snow falling down from varying heights).

Northern Mountains: individual ranges

1. The Karakoram range:

- Average height 6000-7000m
- Run from Hunza to Shyok, 400km, in an E to W direction
- Deep, narrow valleys, sharp peaks
- K-2 highest peak
- Khunjerab and Karakoram passes
- Hunza, Baltistan valleys; Gilgit, Skardu famous areas.

2. The Himalayas:

- South of Karakoram range, separated by River Indus
- Subdivided into :

(a) The great/central Himalayas, up to 6000m, Indus makes it southern and western boundary

- Nanga Parbat (8126m) highest peak, 2nd highest in Pak
- Glaciers e.g. Rupal (N), Rupal (S)
- Dasu Patan valley 6500m deep
- Drained by Indus

(b) Lesser Himalayas, 1800-4600m

- In Kashmir, Pir Panjal range
- In Abbotabad, Mansehra districts and Murree and Galiat region
- No glaciers.

(c) Lower/Sub-Himalayas:

- 600-1200m
- Southern most of the Himalayas range
- Also called the Siwaliks
- Located mainly Rawalpindi-Islamabad area.

3. The Hindukush:

- NW of Pak, west of Karakoram
- Rivers Hunza and Gilgit, boundary between Karakoram and Hindukush.
- River Ghizer, southern boundary
- In the north, merge into the Pamir Plateau
- Height 500m, Tirich Mir (7690m) highest peak
- Baroghil Pass between Pak and Wakhan (Afghan territory).
- Shandur Pass between Gilgit and Chitral
- Lowari Pass between Chitral and Swat+Peshawar; Lowari Tunnel has further improved connectivity.
- Swat, Dir, Kohistan ranges also located in Hindukush
- Drainage: Rivers Kabul, Indus, Swat, Panjkora.
- Glaciers e.g., Tirich Mir and Sakiz Jarib

Life and Economy in the Northern Mountains

- Factors restricting human activity:
- Highly rugged land, unusually cold winters, heavy snowfall, difficult and narrow mountain passes, difficult to grow crops on large scale; develop infrastructure (roads etc.) and set up major factory industry
- Shortage of safe drinking water; water frozen during winters due to sub-freezing temperatures

Human Activity (human environment):

- Fruit farming, e.g., dry fruits, apple, apricots etc.
- Crop farming, mainly as "terrace farming", a type of subsistence farming (crops grown on small flat patches on mountain and hill slopes)
- In winters those staying indoors, remain busy in cottage industry, e.g., carpets, rugs, straw items, embroidery etc.
- Only a few major industries, e.g., fruit processing industry (drying apricots)
- Limited amount of seasonal earning from tourism
- Livestock farming, usually Transhumance (seasonal migration of farmers with herds of livestock).
- Trade activity between some major towns through such trade routes as Murree-Rawalpindi, Gilgit-Punjab, Kaghan-Punjab etc. due to transport linkages; construction of Motorways is also helpful in movement of goods and people.

Economic Potential and Importance

- Huge water reserves for HEP (Hydroelectric power) and irrigation of corps in the Indus plains.
- Natural routes and passes linking Pakistan with China, Afghanistan and Central Asia via Afghanistan; KKH and CPEC to play a vital role in future
- Natural protection by mountains peaks against the cold winds coming from Siberia; scenic beauty of valleys, slopes, peaks, glaciers attract large number of tourists; potential of huge income from high adventure tourism.
- Forests act as natural habitat to wildlife; also provide timber, firewood and wood for many industries, e.g., furniture and sports goods
- Untapped minerals e.g., gems, limestone etc.

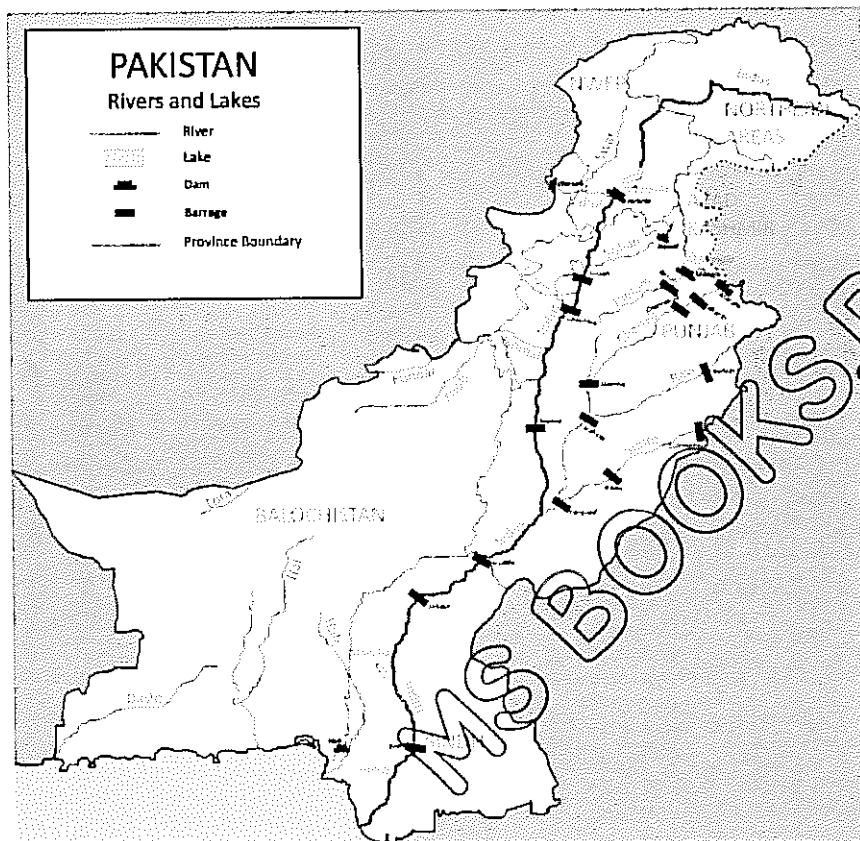
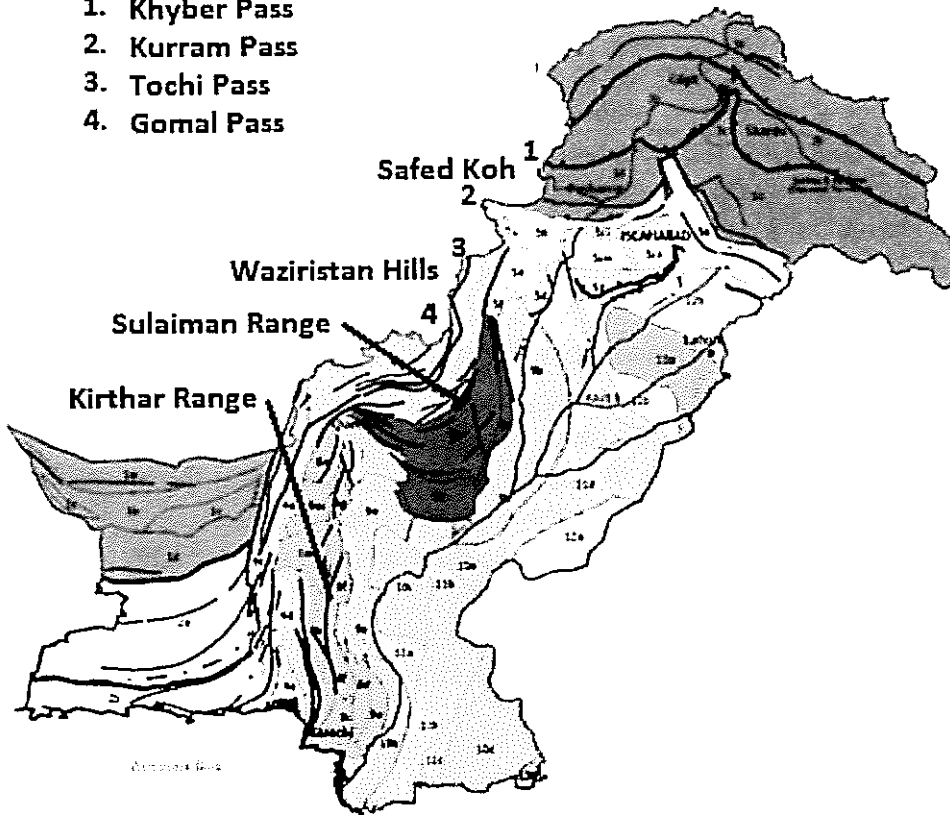
Effects of Human Environment on Physical Environment

- Threat to physical environment by growing population and economic activity, e.g. soil erosion and landslides due to infrastructure development projects; more deforestation due to failure to supply natural gas, meeting the needs of livestock, construction of roads and rapidly growing population
- Water pollution due to negligence by tourists and the government, leading to water-borne diseases e.g., dysentery, cholera etc.
- Tourism causing land, air and water pollution due to development projects, use of poor quality vehicles and negligence shown by tourists to such attractions as Lake Saif-ul-Muluk, some rivers etc.

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Western Mountains (W. Mountains)

1. Khyber Pass
2. Kurram Pass
3. Tochi Pass
4. Gomal Pass



Natural Topography and Drainage:

- South of N. mountains, river Kabul separates N from W mountains
- A series of parallel ranges; north to south, with decreasing height: Safed Koh range (4700m), Waziristan hills (3500m), Sulaiman range (3380m) and Kirthar hills (upto 2170m).
- Rugged landscape but not as much as in northern mountains
- No glaciers; no snow-capped peaks except for Safed Koh Range.
- Some intermontane/intermountain valleys: Peshawar, Bannu and Kohat, with flatland areas.
- Some famous historic passes e.g. Khaybar, Kurram etc.
- Some western tributaries of the Indus provide drainage; they include rivers Kabul, Kurram and Tochi.

(i) Safed Koh, run east to west, often covered with snow

- River Kurrum south of the range: also, Kurrum Pass and Khyber Pass; drained by river Kohat
- Peshawar valley, drained by rivers Kabul and Swat, 300m high
- Kohat valley, 460m high

(ii) Waziristan hills:

- Between Kurrum and Gomal rivers
- Together with the Safed Koh range, form a rampart (partition) between Pak and Afghanistan.
- Bannu valley, east of Waziristan hills, near the Tochi Pass
- Drained by rivers and streams e.g., rivers Tochi and Gomal
- Bannu valley is 150m high

(iii) Sulaiman and Kirthar ranges:

- Between the Balochistan Plateau on the west and the Indus plains on the east
- Extend from the Gomal river in the north to the Arabian Sea in the south, 850km length
- Sulaiman range, west of Indus river, average height 1500m with Takht-i-Sulaiman highest peak (3383 m)
- Kirthar range, average height 1500m
- Bolan Pass, west of Sulaiman range
- Drainage by Gomal, Zhob, Hab and Lyari rivers.

Life and Economy in Western Mountains

Factors limiting human activity:

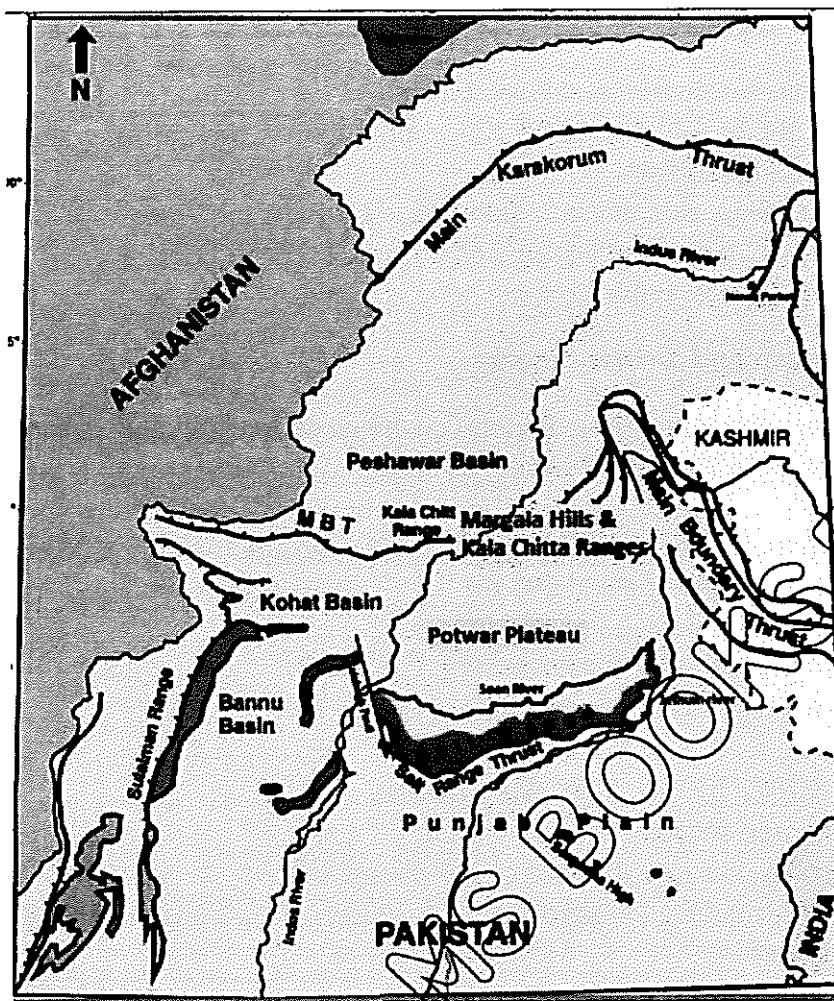
- Rugged terrain, cool to cold winters, lack of vegetation
- High cost of developing infrastructure, e.g., water, power, gas supply, transport system and canal irrigation.

- Difficult to develop mining, industries; difficult to provide health and education services; opposition by the tribal chiefs, and terrorism after the 9/11 incident, and disturbed Pak-Afghan relations.
- Continuously neglected by various governments due to terrorism across the Pak-Afghan border.
- In 2020, FATA's merger with KPK has increased load on KPK, and FATA would better have been made another province.

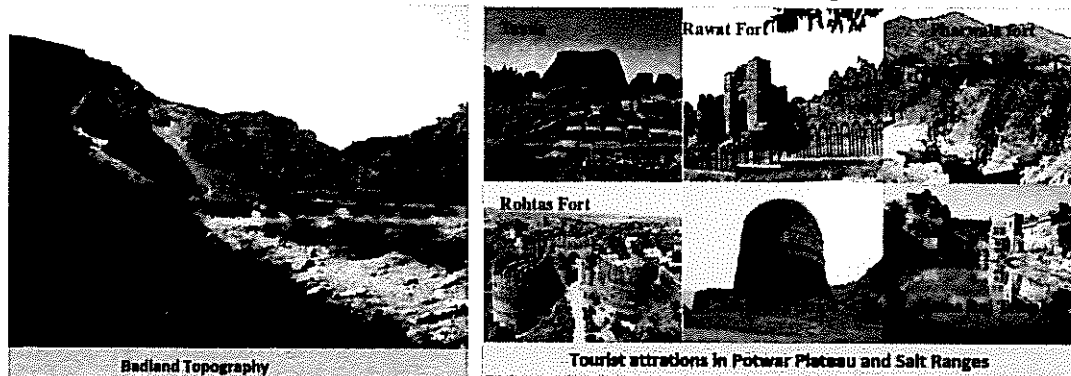
Human Activity/Human Environment

- Nomadic livestock farming, goats and sheep rearing
- Mining of limestone, gypsum, marble
- Large scale crop farming in valleys e.g., Peshawar where Warsak dam on River Kabul provides irrigation; rice, wheat, sugar cane, tobacco, main crops.
- Sugar, tobacco, cement industries in Peshawar, Kohat, Mardan.
- Metalled roads, rail transport in valley towns e.g., Peshawar, Kohat and Mardan; last railway station at Dargai in the region; air transport also available in major towns.
- Historic remains of Buddhism in Peshawar and Swat regions, attraction for tourists.

The Potwar Plateau and the Salt Range



Location of Potwar Plateau and Salt Ranges



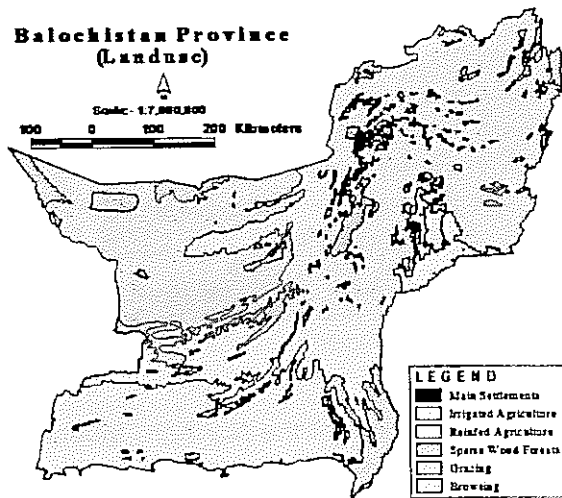
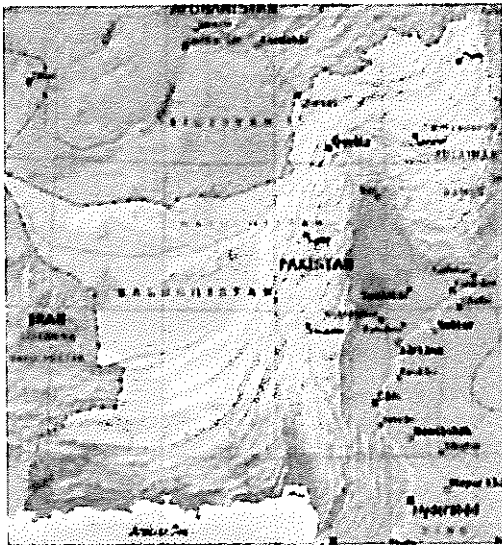
(1) Topography:

- Located south of the Northern Mountains and Islamabad between Indus on the west and Jhelum River on the east
- In the north, Margalla Hills and Kala Chitta Ranges
- In the south Potwar Plateau is separated from Salt Ranges by River Soan
- In the west, the region crosses the Indus River and enters the Bannu Valley.
- 300-600m high
- Kala Chitta and Khairi Murat hills, up to 1000m
- Salt Ranges, 750-900m, the Sakesar Peak is 1527m high; opens into the UIP.
- Badland topography__ badly dissected and eroded land due to physical and human factors, e.g., heavy Monsoon, thunderstorms and poor farming (overgrazing and stagnant irrigation water on hill slopes)
- Land marked by elevations and depressions, e.g., ridges, gullies, ravines, troughs, bare rocks and residual hills due to constant erosion and deposition __ also alluvial plains as a result of the action of the rivers.
- **Drainage:** Rivers Soan, Sil, Haro etc. and lakes e.g., Kalar Kahar, Khabeki and Uchali

Life and Economy/Human Environment

1. Farming: Mainly Barani/Rain-fed farming of wheat, grains, barely, maize; canal irrigation difficult due to uneven landscape
2. Mining: Rich mineral deposits, e.g., gypsum, limestone, soapstone, rock salt, marble __ many cement, ceramics and chemical factories __ coal and oil; Attock Oil Refinery, at Morgah near Rawalpindi
3. Agricultural institutes e.g., University of Arid Agriculture, Rawalpindi; ABAD Colleges (about Barani agriculture), Rawalpindi and Jhelum.
4. HMC (Heavy Mechanical Complex) at Taxila, second large scale iron industry; a college of UET (University of Engineering and Technology), Lahore.
5. Some public and private sector medical colleges
6. G.T. Road runs parallel to the M-1 phase of Motorway, near the HMC
7. Main railway track, Peshawar to Karachi is close to many major towns of the regions

The Balochistan Plateau



Physical Features:

- Located in SW Pakistan
- Diversified topography and drainage
- Height 300-3010m
- Physical features of eastern part different from those in the western part
- Eastern part has mountain ranges, plateau and Lasbela Plain
- Western part has many ranges and basins

1) Ranges and basins in Northern and Western Balochistan

i. Northern Balochistan:

- Zohb and Loralai basins between the Toba Kakar and the Sulaiman Ranges
- Quetta valley surrounded by various ranges, in SW of Loralai basin
- Narrow streams flow downhill in rainy season (after many years), deposit alluvial soil, gravel, sand and boulders at the foothills and alluvial fans are formed on the 'Piedmont Plains.'

ii. Western Balochistan:

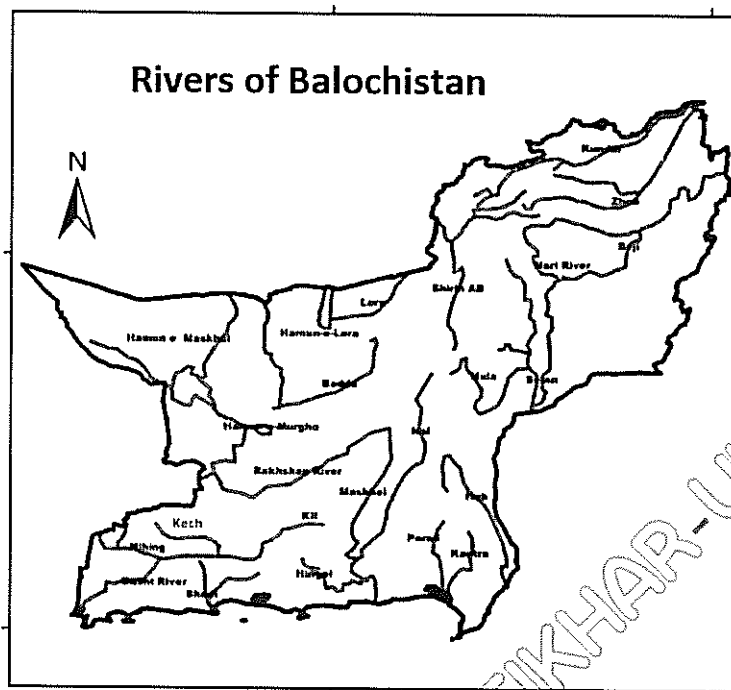
- A series of mountain/hill ranges with basins between them
- Ranges includes: Chagai Hills, Ras Koh (2000m), Siahan (2000m), Central Makran (1000-1200m) and Coastal Makran (200-600m), running N to S.
- Central Bahui Range, east of Quetta.
- No outlet of basins to the Arabian Sea; when it rains (after a long interval of dry period), rain water drains into temporary rivers and streams that flow into the basins and either soak into ground or gather in temporary lakes ___ inland drainage pattern of Balochistan.

B. The Coastal Areas:

- Eastern part is the Lasbela Plain, marked by gravel and sand dunes, drained by River Porali
- Western part is the Makran Coast ____ a narrow coastal plain with coastal Makran Hills; extends from Karachi to Jiwani.

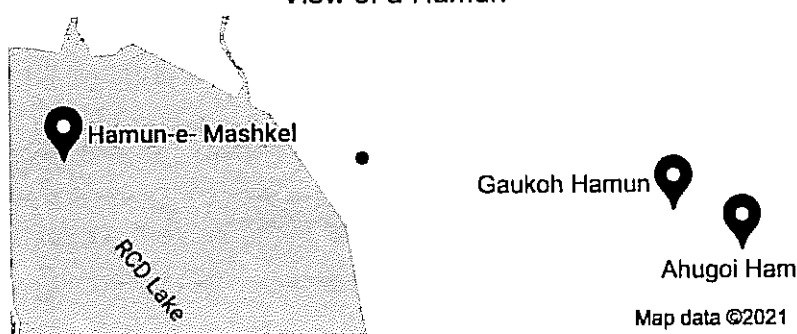
Drainage of the Balochistan Plateau

- Many rivers with different destinations, and the inland drainage by dry lakes or Hamuns.
 - i. Some rivers join the Indus from the west, e.g., Zhob, Kalachi and Khandar
 - ii. Some drain into the Arabian Sea, e.g., Hab, Porali, Mashkai and Hingol (the largest river of Balochistan)
 - iii. Rivers Mula, Bolan, Loralai and Chakar are absorbed into the Kachhi Sibbi Plain (continued into the Lower Indus Plain)
 - iv. Many small rivers and streams flow westward and drain into Hamuns (shallow depressions) in the N part of SW Balochistan
 - Area between Ras Koh and Chagai hills in the north and the Siahan Range in the South is quite dry, with small rivers that flow during rainfall only
 - Some of these disappear into sand while others reach the Hamuns.
 - This is the inland drainage
 - Largest of all is the Hamun-i-Mashkel in the western part of Kharan desert
 - Others: Hamun-i-Lora between Chagai and Ras Koh; Hamun-i-Murgho between Siahan and Ras Koh





View of a Hamun



Inland Drainage / Hamuns in Balochistan

Life and Economy

1. Factors limiting human activity:

- rugged land in several parts, e.g., Western Balochistan
- Too hot summers in Kharan desert and neighboring SW parts
- Shortage of water due to arid climate
- Little water for drinking and irrigation
- Karez, diversion channels and tubewells provide some water
- Poor transport and communication system
- Only a few railway links
- Absence of link-roads between farms/mines and the main roads
- Roads and railways not in good condition
- Low priority given by most of the governments since 1947 and so, no major development projects except for the more recent Gwadar and CPEC Projects.
- Very low population density, few major industries and poor social services e.g., education, health, security etc.

Economic Resources

1. Minerals:

- Variety of metallic and non-metallic minerals, partly/totally untapped, e.g., copper, chromite, coal, oil, gas, gold (recently by discovered, 2010), silver and antimony.

2. Agriculture:

(a) Fruit farming in cool areas and Karez-fed oases in SW Balochistan

- Plums, peaches, apples, apricots, pomegranates, grapes and almonds in abundance; great export potential as 75% of total production in surplus, and good quality

(b) Vegetable seeds:

- Chilly weather for transplantation and warm, dry weather for flowering and ripening of vegetable seeds, in many parts of Balochistan

(c) Livestock Farming:

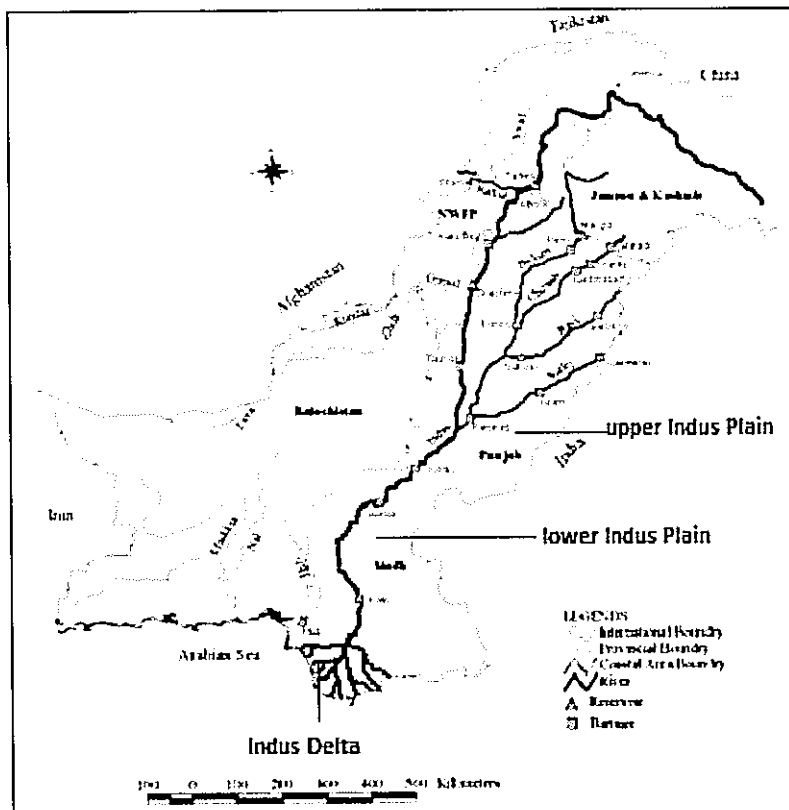
- Nomadic farming
- Imp products: wool, goat hair and skins for both domestic needs and exports

3. Fishing:

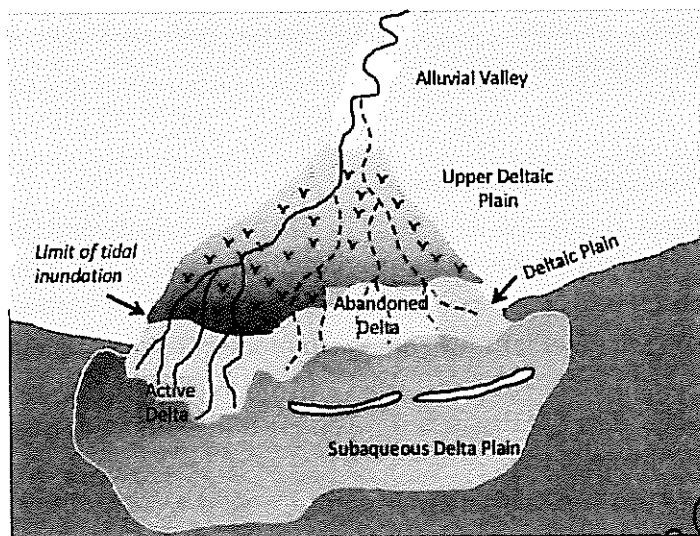
- Marine fishing on Makran coast, about 30% of total fish catch
- Subsistence and commercial scale
- Gwadar, Pasni, Ormara — 3 major ports with potential of deep-sea fishing development at Gwadar.

Future Prospects

- Exploring and exploiting mineral wealth
- Specially, Copper in Saindak and Gold in Reko Diq (discovered in 2010) can develop Balochistan and whole of Pakistan; rearing sheep and goats along modern lines can satisfy food needs and promote leather, woolen textile and food industries
- Deep-sea fishing at Gwadar and setting up modern fishing institutes can supplement income from fishing industry
- Setting up EPZ's (Export Processing Zones) and industrial estates at Gwadar can boost economic growth
- Developing modern transport system e.g., Coastal Makran Highway and CPEC will connect Balochistan to the rest of Pakistan and neighbouring countries in the north and northwest.



Indus Plains

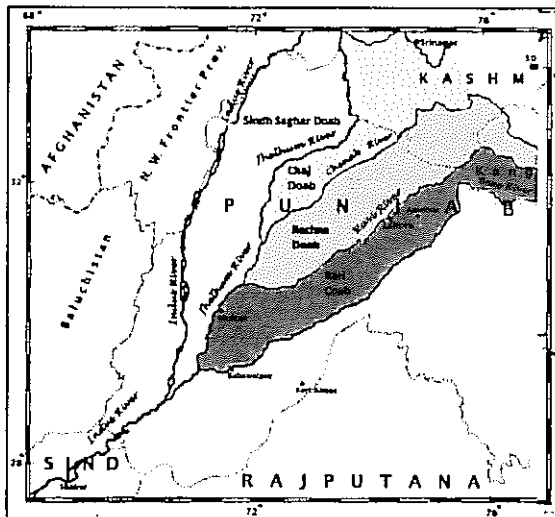


Indus Delta

The Indus Plains

- Formed by the alluvium spread by the IRS (Indus River System) in most of Punjab and Sindh.

Subdivided into: UIP (Upper Indus Plain), LIP (Lower Indus Plain), ID (Indus Delta/Tidal Delta), Piedmont Plains and Desert Plains.



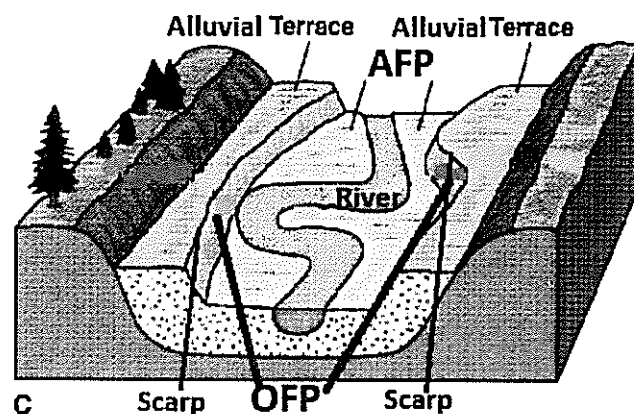
Alluvial Terrace (Bar Upland)

- Kirana Bar in Chaj Doab
- Sandal Bar in Rachna Doab
- Ganji Bar in upper Bari Doab
- Nili Bar in lower Bari Doab

I. UIP:

- Slopes NE to SW
- Height decreases from 300m in the north to 75m at Panjnad in the south
- Extends from Attock to Panjnad
- Land of 5 rivers (Indus and its eastern tributaries) and 4 Doabs (land between 2 rivers)

Landmarks across a Doab



I. AFP (Active Flood Plain):

- Strip of flat land
- 2-3m high from the river level
- About 15km wide
- Flooded every year by the start of summer (glacial melt + Monsoon)
- Fresh alluvium is deposited every year, making it ideal for agriculture
- Marked by Meanders (curves in the course of a river), ox-bow lakes (more pronounced Meanders), Levees (slightly raised land due to continued deposition of alluvium) and braided channels (many Meanders interlacing each other); all these to be seen at the end of the rainy season.
- AFP along all rivers except for the southern half of Ravi due to low volume of river.

II. OFP (Old Flood Plain):

- Strip of flat land between bar upland and AFP
- About 3-5m high, 12km wide
- Flooded every 7-8 years when heavy floods carry river waters beyond AFP
- 7-8 years old alluvium is deposited on the OFP
- Highly suitable for agriculture
- Part of the plain closer to AFP is MFP (Meander Flood Plain) and the part towards the alluvial terrace is called CFP (Cover Flood Plain)
- Marked by Meanders, abandoned channels and dried ox-bow lakes.

III. Scarp/Bluff/Cliff:

- Steep slope from CFP to Alluvial Terrace/Bar Upland (highest point across a Doab)
- 5-11m high, about 6m wide
- UIP also has slate hills/Quartzite, Piedmont plains, alluvial fans (plains on the foothills) and sand plains.

IV. Alluvial Terrace/Bar upland:

- Strip of flat land on the highest point across a Doab
- Around 11m high, 25-30km wide
- Covered by very old alluvium (Bhangar)
- In Sindh Sagar Doab (between Indus and Jhelum), Bar upland is covered by Sand
- Safest and most suitable for human settlement and economic activity

Drainage:

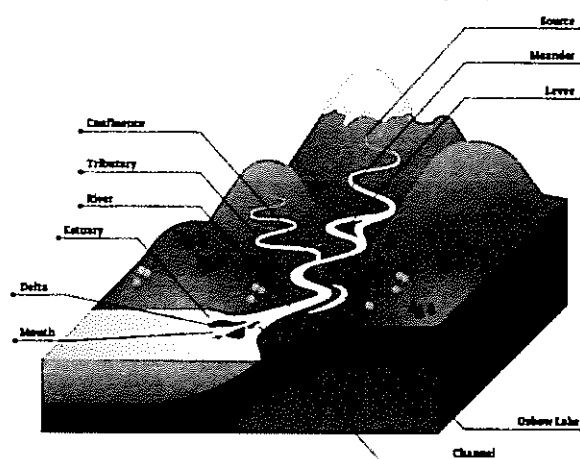
- Indus and its tributaries
- Many small but mainly 4 eastern tributaries drain UIP
- Width of Indus about 1.4km in UIP
- Marks of passage of rivers e.g., Meanders, Ox-bow lakes and Braided Channels, visible.

LIP:

- Panjnad in Punjab to Thatta in Sindh
- At Panjnad 5 rivers (Jhelum, Chenab, Ravi, Sutlej, Beas) join to flow as a single river called Panjnad for 72km to finally join Indus at Mithankot
- Mithankot to Thatta, Indus alone carrying waters of all its tributaries
- LIP slopes N to S, lower in height from UIP
- AFP (wider than that in UIP) and OFP between Indus on the west and Nara desert (an abandoned channel)
- No Bar upland as Indus alone flows
- Shares most of the landmarks with UIP, e.g. a few low hills (and so, alluvial fans and piedmont plains), Sandy plains with rolling sand dunes, Meanders, Ox-bow lakes, Braided Channels
- Instead of Quartzite (in UIP), limestone ridges or Cuestas in LIP.

Drainage:

- Mainly Indus alone carries waters of all tributaries
- Only a few minor tributaries e.g., Zhob, Kalachi and Khandar rivers but they contribute little bulk as compared to the eastern tributaries in UIP
- Indus is about 1.6km wide in LIP
- Instead of continuously flowing as a single stream, Indus breaks up into many distributaries at Thatta before falling into the Arabian Sea.



ID (Indus/Tidal Delta)

Topography:

- Thatta to the Arabian Sea
- Indus splits into branches/distributaries that fan out to make a triangular plain (Deltaic plain) before draining into the Arabian Sea
- Raised banks (Levees) of distributaries due to deposition of alluvium
- Encroaching sea water fills up the depressions (trough) between distributaries to form marshy land
- Also, mud flats and bars on ID.
- Bars near the Coast, flats towards inland part of the Delta

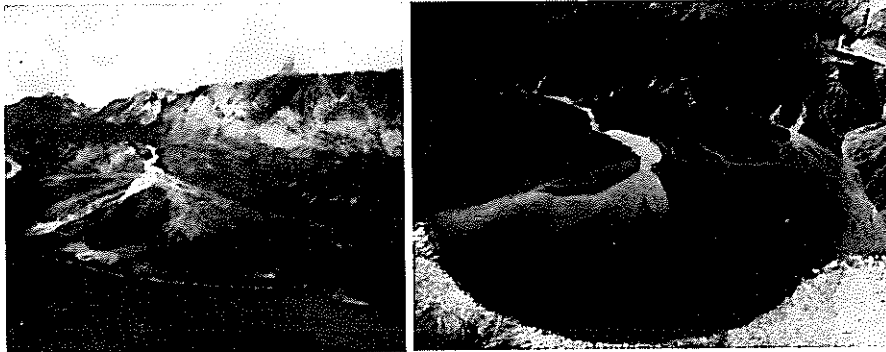
Drainage:

- Named and unnamed distributaries of Indus, e.g., Lyari, Kalri, Pinyari lakes.

(4) Piedmont Plains

- Literally "plains at the foothills"
- Part of the Indus Plains
- Mainly, beyond the eastern slopes of the Sulaiman and Kirthar ranges, though many smaller piedmont plains at other places, e.g., on the southern side of the Siwaliks in the Chaj Doab (between Chenab and Jhelum Rivers) and in the Rachna Doab (between Chenab and Ravi rivers).
- The Sulaiman Piedmont Plain is called the Derajat.
- Medium and small rivers flowing downhill, slow down on reaching the foothill and split into a number of smaller streams that fan out from the main stream over a vast triangular area the alluvial fans or alluvial cones

- Gravel, sand and salt brought by the river is spread on the alluvial fan
- From Sulaiman-Kirthar slopes, the Piedmont Plains extend upto the Indus River.
- All the plains are suitable for agriculture.



Images of Piedmont Plain and Alluvial Fan

(5) The Desert Plains

3 main deserts in Pakistan:

(i) The Thal Desert in the Sindh Sagar Doab between Indus and Jhelum rivers

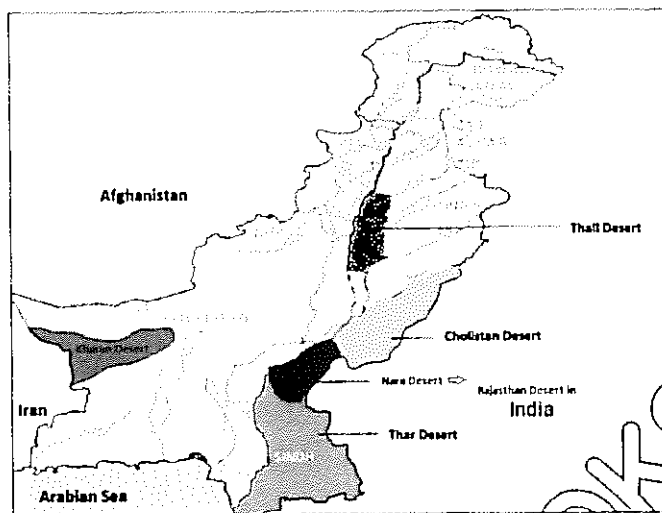
(ii) The Kharan Desert in SW Balochistan, near Chagai Hills

(iii) The Thar Desert, subdivided into:

(a) Cholistan (Punjab)

(b) Nara (Sindh) and

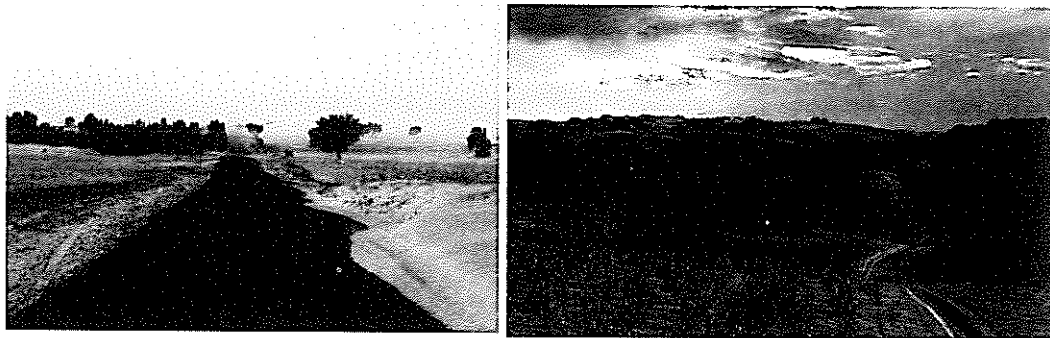
(c) Thar or Tharparkar (lower Sindh)



Deserts of Pakistan



Images of Thar Desert



Images of Thal Desert

Natural Topography of a Desert Plain

- Typical features of a desert plain in the Thar Desert, a 75000 sq km area of Punjab and Sindh
- Constantly blowing wind determines topographic features:
 - Vast, gently undulating sandy plain
 - Varying elevations on the plain, e.g., Sandy ridges
 - Crescent-shaped, shifting dunes in the northern part; stable, latitude dunes and ridges the southern part; in the eastern part, transverse sand ridges and dunes
 - Rolling sand hills
 - Bare rocks and weathering of rocks due to lack of water
 - Wide interdunal valleys (between the dunes)

Life and Economy in the Indus Plains

- UIP and LIP, centre of human activity since ancient times
- Growth of agriculture, industry and trade with developed infrastructure resulted in high population density in several parts and emergence of many major towns.
- Subsistence and cash crop farming
- Rice, Cotton, Sugarcane, Wheat and many secondary crops
- Extensive network of irrigation canals, roads, railways
- Quick movement of agriculture and mineral raw materials, products and workers
- Continental climate and irrigation canals help large scale cultivation of main crops
- Power from HEP and thermal plants to help industrial development.

Deltaic, Piedmont and Desert Plains

- Relatively less developed
- Reduced water supply to the Delta due to reservoirs
- Upstream supply of the Indus adversely affected agriculture, fishing and mangrove forests
- In Piedmont plains, a little better
- Large scale agriculture in the Derajat, but not many factory industries and transport links due to their location west of the Indus

Desert Areas:

- Very difficult life due to severe shortage of water, very hot summers, hot winds, sand storms and lack of vegetation.
- Nomadic livestock farming with sheep, goats and camels
- Subsistence farming of wheat, grams etc.
- Also, commercial farming with the extension of canals from the Sukkur Barrage on the Indus
- Mining of coal and oil
- Good prospects of the "Thar Coal and Power Project" after discovery of one of the world's largest coal reserves in Thar.

Sample question according to new pattern:

This requires a comparative study of the two given statements. Students should start their answer by supporting the statement they plan to agree with LESS and explain a few of its advantages/disadvantages so that they have a good space and arguments for the other statement. About four advantages of the other statement (with which they agree MORE) should be explained with some named examples, and a conclusive statement should also be given at the end. There may be questions that ask for agreeing with both statements. Same technique will be followed as given above: a greater number of advantages/disadvantages of one, and a fewer advantages/disadvantages of the other statement.

Statement A	Statement B
Mountainous areas and the Balochistan plateau need to be developed as they can feed Pakistan's economy.	It is easier to develop the Indus plains as most of the major towns are located there.

Q. Which statement do you agree with more?

[6]

Ans.

It is true that most of industrial and agricultural activities are concentrated in the major towns of the Indus plains. However, all the major cities have been attracting a huge number of migrants from rural areas. This has resulted in the growth of Kachi Abadis/shanty towns. Factories and a poor quality vehicles have contributed to air and water pollution. Therefore, I support statement A more because the under developed mountainous areas and Balochistan have huge potential of development. Balochistan has several deposits of minerals including gold that has been recently discovered at Reko Diq in Chagai District. The Makran coast constitutes about 70% of the total coast of Pakistan

and if it is developed for modern fisheries and for a modern port at Gwadar, it will boost economic growth of Pakistan and the issue of terrorism will also be countered. Similarly, northern mountains have several tourist attractions in the form of snowfall, snow-capped peaks, pleasant summers, valleys and meadows. Therefore, it's vital to urgently develop a strategy of short and long term projects in these areas. This will surely improve the security situation, and reduce the economic disparity between these and the already developed areas of Punjab and Sindh.

Sample Questions

Q. To what extent can the mountainous areas of Pakistan be developed?

[6]

Note: While writing answers of such questions, both helping and hindering factors/success and failures/advantages and disadvantages, with named examples, should be explained. A judgement should be given at the end.

Ans.

Northern mountains have tremendous potential for the development of tourism industry. Eight out of twenty highest peaks in the world are located there that can attract high adventure tourists/mountaineers. Cool and pleasant summers as well as snowfall in winters are also good attractions in addition to lakes, waterfalls, lush green valleys and added attractions like lift chairs and cable cars. If government supports cottage and craft industry, provide electricity and introduce literacy schemes, these areas can contribute to Pakistan's economic growth while restricting rural-urban migration. Government can also provide technical and financial assistance through micro finance schemes to the craftsmen of these areas. Small scale HEP (Hydro-electric Power) plants can be set up at many places. Projects like Motorways and CPEC (China-Pakistan Economic Corridor) will stimulate economic activities. However, lack of political will, political instability, corruption and mismanagement of funds and growing terrorism after the 9/11 developments are major stumbling blocks. Huge investment is required to develop infrastructure and it's difficult to carry heavy machinery to such heights and arrange a huge workforce that can work in sub-freezing temperatures. It may be concluded that the mountainous areas can be developed significantly by granting full provincial status to GB province and following a sustained development policy that should be binding on all the coming governments.

DR IFTIKHAR-UL-HAQ

CHAPTER 02

CLIMATE OF PAKISTAN

A: Climate Zones:

i) Highland Zone:

- Northern and Western Mountainous areas.
- Winters: long, cold, snowy.
- Summers: short and mild.
- Rainfall decreases N to S; at greater altitude, snowfall
- Gilgit, Chitral and Quetta valley are rain-shadow areas; rainfall on the windward slope, while little or no rainfall on the leeward slopes of the mountains.
- North of Waziristan and Kohat: rain from all sources: primary Monsoon, Western depressions and thunderstorms.
- South of Kohat and Waziristan: mainly winter rain, Western depressions.
- Temperatures rise north to south; summers are wet, short and mild towards north; dry and warm in Western Mountains.
- Sub-freezing temperatures in extreme north, due to greater distance from the heat reflected from the land surface.

ii) Lowland Zone/Semi-Arid Zone

Whole of Indus Plain except the Delta region of the coast

- Arid to semi-arid climate
- Continental climate, with greater temperature difference between summers and winters
- Hot to very hot summers and cool winters.
- Upper Indus Plain (northern Punjab) receives Monsoon, Western depressions and thunderstorms rainfall.
- Southern Punjab and Lower Indus Plain receive mainly secondary Monsoon; very little rain from other sources.
- Rainfall decreases, temperature rises north to south.

iii) Coastal Zone/Humid Zone

- Indus Deltaic Plain, Karachi coast and Makran Coast
- Sea breezes and maritime (oceanic) influence keep the daily and seasonal temperature difference low
- Different rates of cooling and heating of water (Arabian Sea) and coastal land enable sea to exert moderating effect on the coastal climate.
- Secondary Monsoon on Indus Delta Coast; Westerns depressions on Makran coast bring rain; tropical cyclones rarely hit coastal areas of Pakistan.
- High level of relative humidity, usually above 50%, April to September.
- Mean monthly temp 32°C; May, June, October hottest months.
- October-November, dry dust storms.

iv) Arid Zone:

- South-east/Thar and south-west/Kharan, Balochistan deserts
- Hot and dry for most of the year.
- Hot, dry, long summers; mild, short winters
- Secondary Monsoon in Thar Desert; western depressions in Kharan desert bring little rain.
- Hot, dry winds throughout summers.

B: Factors Affecting Pakistan's Climate:

1: Latitudinal effect / changing angle of the sun:

- Pak not very far away from the Equator, receives direct sun rays due to its sub-tropical (just north of tropic of cancer) location.
- South to north temperature decreases with a in the angle of the sun: due to a change of latitude.
- Seasonal (summer/winter) temperature differences also due to a change in the angle of the sun.
- During summer, the northern hemisphere of the Earth is tilted towards the sun and so, absorbs more heat; Pakistan is in northern hemisphere; so, high summer temperatures.
- During winters, the northern hemisphere tilts away from the sun, less heat absorbed by the earth and so, cooler temperatures in Pakistan.
- Latitudinal factor also determines the length of day and night due to the spin of the Earth around its own axis; shorter days and longer nights in the northern areas; longer days and shorter nights in the southern parts.

2: Altitude Factor:

- Air absorbs most of the water vapour, dust particles and solar radiation at sea level (southern, coastal parts) and so, is densest there.
- Less solar radiation is absorbed at greater altitudes, making air least dense at greater heights.
- An average drop of 6.5°C in temp for every 1000 m increase in height.
- Diversified topography – highlands, plains, desert and coastal areas, resulting in climatic zones based on the type of topography:
 - i. Generally high temp due to latitudinal factor and Sub-tropical location
 - ii. Continental effect causes extremes of climate in most of the Indus plains.
 - iii. Maritime/Oceanic factor has moderating effect on the coastal climate; low temp difference both daily and seasonally.

3: Cloud Cover:

- Clouds reflect solar radiation at daytime, causing a relatively low temperature on the earth.
- At night, clouds trap the outgoing heat, resulting in lesser drop in temp as compared to that on a clear sky.

4: Rain Shadow Areas:

- Gilgit, Chitral and Quetta are located on the leeward slope of the hills where lesser rainfall occurs.
- These areas are rain shadowed by the leeward side of the hills.
- The windward slope (opposite the leeward slope) receives good amount of rainfall.

5: Temperature Inversion Layer:

- In the desert areas, hot but dry air rises to a significant height.
- No condensation takes place as there is no moisture in the air.
- It just returns as warm or somewhat cool air, and so, no rainfall occurs.
- Thar and Kharan deserts and their neighbouring areas experience this phenomenon, and therefore, experience arid climate for most part of the year.

6: Diversified Topography:

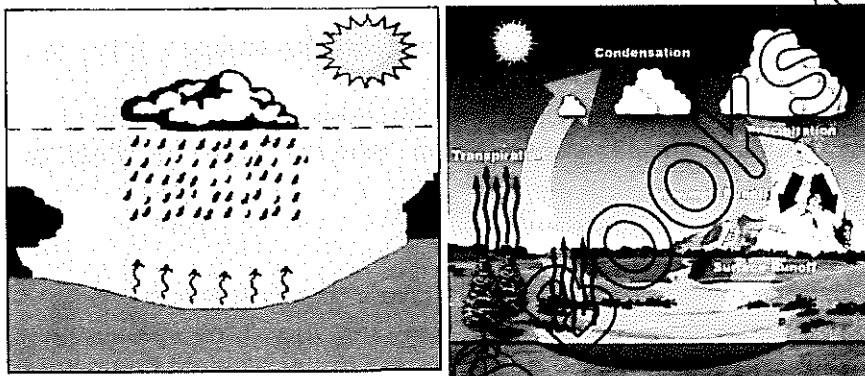
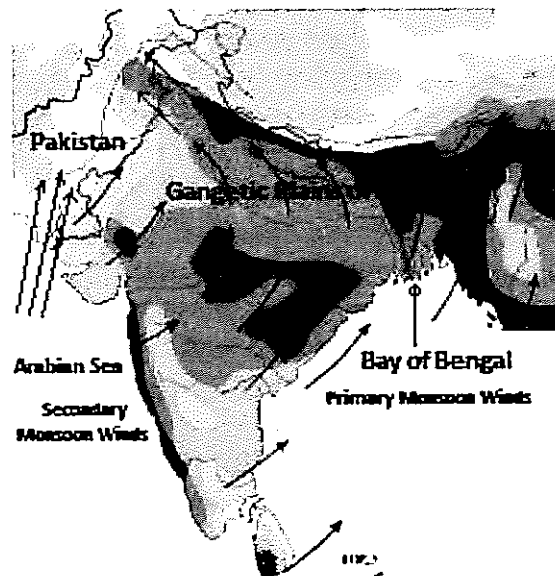
- A variety of landforms of Pakistan.
- Highlands, plateaus, plains, deserts and coastal areas.
- Each of these have their peculiar climatic features and sources of rainfall.

7: Different Types of Rainfall:

- **Precipitation:** Coming of moisture from atmosphere to land. It may be rainfall, snowfall, hail storm or dewdrop.
- **Evapotranspiration:** Loss of moisture from land and plants. In Pakistan, generally there is more evapotranspiration than precipitation.
- Various parts of Pakistan receive rainfall in various parts of the year through different sources.
- Monsoon, Western Depressions and Thunderstorms are the main sources.
- Tropical cyclones and relief rainfall are also types of rainfall.
- Major sources cause rainfall mainly in the northern parts of Pakistan.

C: Types of Rainfall in Pakistan

(I) Monsoon/Primary and Secondary / South-West Monsoon



July – September

Primary Monsoon

- Start of summer; continents (inland areas) heat up; hot air rises quickly to create a low pressure area in Pakistan.
- Ocean water picks up heat slower than the continents and so, a relatively higher pressure prevails over the Bay of Bengal.
- Low pressure area over northern mountains of Pakistan attracts moist winds from the high pressure area over the Bay of Bengal.
- Winds cross Bangladesh and northern Indian plains to enter Pakistan from its northern and eastern sides.
- Moist winds strike hot land of northern Pakistan; they expand, become lighter and rise to a height where they get condensed.
- Clouds and rain drops are formed.
- Heavy showers of variable intensity and duration in northern, north-western and eastern parts of Pakistan; northern mountains, several parts of KPK (Khyber Pakhtunkhwa) and upper Indus plain areas, most of Punjab.

Secondary Monsoon

- Some relatively weaker winds originate from the Arabian Sea to cause some rain in the Indus Delta including Karachi and most of the lower Indus plain.
- Moist winds from the Arabian Sea are attracted by a low pressure area in the lower Indus Plain; get expanded and lighter; rise to a good height and get condensed.
- Clouds and rain drops are formed to cause moderate amount of rainfall in the region.
- Tail end of the Monsoon reaches Pakistan; highly variable rain in amount, timing and distribution.

Advantages of Monsoon/Summer Rainfall

- Pleasant weather with fresh air.
- Reduced pollution
- Good working conditions for the people
- Filling of reservoirs; more water for irrigation of Kharif crops such as rice, cotton and sugarcane, and for HEP (Hydro Electric Power) production
- More water for inland and marine fisheries.
- Raised water table in areas where it has become very low.

Disadvantages of Monsoon Rainfall (see disadvantages of “River Floods”)

River Floods

- Excess water in rivers overflows their banks due to natural and human factors.
- i) **Natural Factors:**
- Glacial melting by the start of summer.
 - Heavy Monsoon rain; both these add to the bulk of river waters.

ii) **Human Factors:**

- Unplanned deforestation, both in the form of cutting of trees on the foothills and overgrazing by livestock, exposes soil to surface run off.
- Failure to raise river embankments to contain rising water level
- Decreasing capacity of reservoirs due to siltation; also, failure to build new reservoirs to divert floods.

Effects of Floods: Advantages and Disadvantages

i) **Advantages/beneficial effects:**

- Return of soil nutrients, e.g. organic salts.
- Enrichment of the Delta wetlands; these wetlands break the momentum of floods by spreading flood water over a large area minimizing destruction.
- Spread of rich, fresh alluvium and sediment to refresh water channels; flooded fields are good for rice cultivation due to plenty of water and rich nutrients.
- Overflowing rivers reduce destructive effects in the areas downstream Indus.
- Ground water table rises due to recharging by floods.
- Healthy growth of inland and marine fisheries due to availability of more nutrients in the Indus and its tributaries (for inland fish) and in the Delta region due to nutrients flowing into the Arabian Sea from distributaries of Indus (for marine fish).

ii) **Disadvantages/Problems:**

- Damage to: crops, livestock, infrastructures e.g. roads, railways, bridges, power supply and communication lines; soil erosion (surface run off), loss of food crops and food supplies.
- Houses in the affected areas are cut off from shops, industries and services.
- Outbreak of water-borne diseases e.g., cholera, malaria, typhoid and dangué.
- Incidents of electrocution
- Suspension of supply of raw materials to industries
- Extra spending by the government on relief and rehabilitation of the affected people.

MS BOOKS.PK



Photographs of Floods

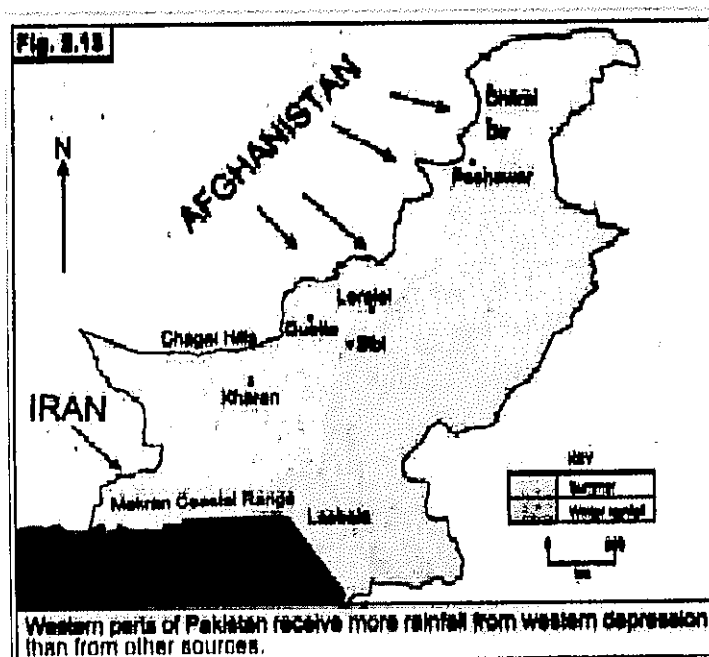
Measures to reduce the destructive effects of floods:

- Building and raising embankments on river banks and enlarging river channel enabling it to hold more water
- Building more reservoirs and channels to divert floods from populated areas
- Discouraging deforestation on foothills and planting more trees to check and weaken the flow of flood waters.
- Preventing buildings and populations settlements in areas within the reach of floods.

- Improving weather forecast and flood warning system; warning people through electronic (radio, TV and social media) and print (newspapers) media
- Improving relief (immediate action) and rehabilitation (long term steps) services by creating special bodies, e.g. PDMA (Pakistan Disaster Management Authority).

Note: North-East Monsoon Winds blow from the north-east of Pakistan to the Arabian Sea in October and November. They bring nominal rainfall in the form of post-Monsoon thunderstorms as the winds do not blow from the sea to the land.

(II) Western Depressions: December to March



- **December to March.**
 - Cyclones originate from the Mediterranean Sea by the start of winters.
 - Travel over dry parts of Afghanistan and Iran; most of the moisture is lost during the long journey
 - Winds enter Pakistan's north-western and western parts; moderate rain in north, north-western and western parts.
 - Upper Indus plain also receives some rain from this source.
 - Main areas: northern mountains, KPK, Balochistan, Makran Coast, many parts of upper Indus plain.

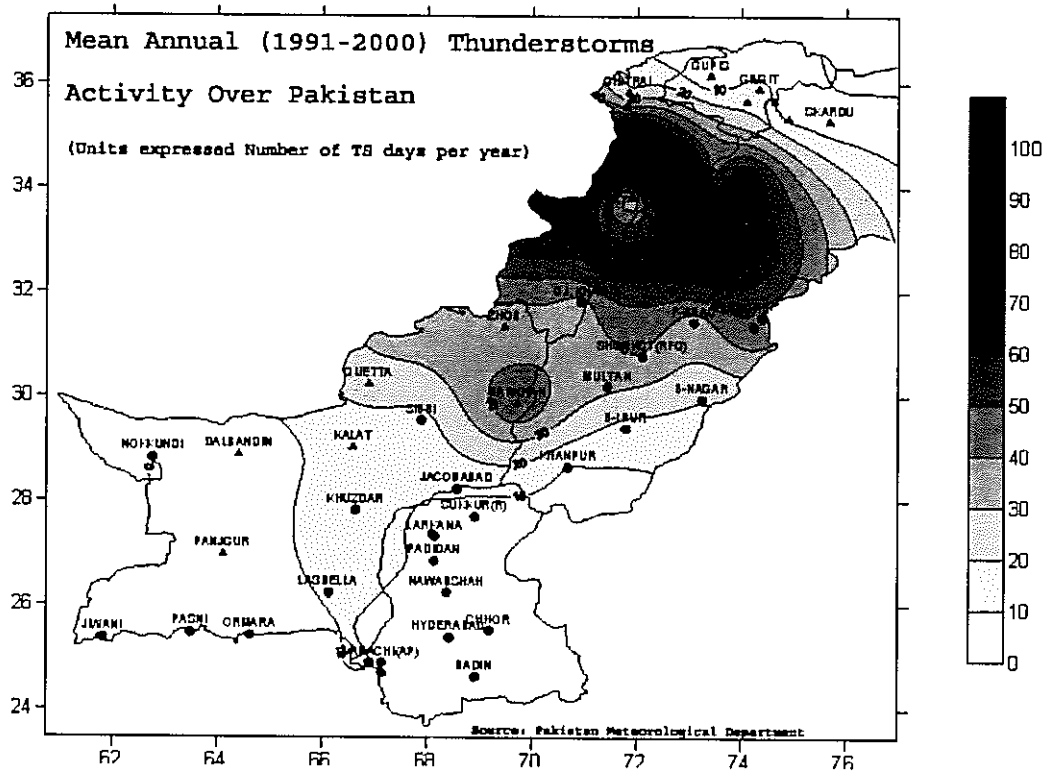
Advantages of Winter Rainfall

- Water for Rabi crops, e.g., wheat, that require moderate rain
- Reduced pollution.
- Filling of reservoirs; as there is no glacial melting in winters, so the western depressions provide some amount of water to the reservoirs.

Disadvantages of Winter Rainfall

- If precipitation is in the form of snowfall, then problems of landslides, blockage of roads and disturbance of traffic.
- In heavy snowfall areas people are forced to stay indoors.
- Some herdsmen in northern mountains are forced for seasonal migration, transhumance due to heavy snowfall.

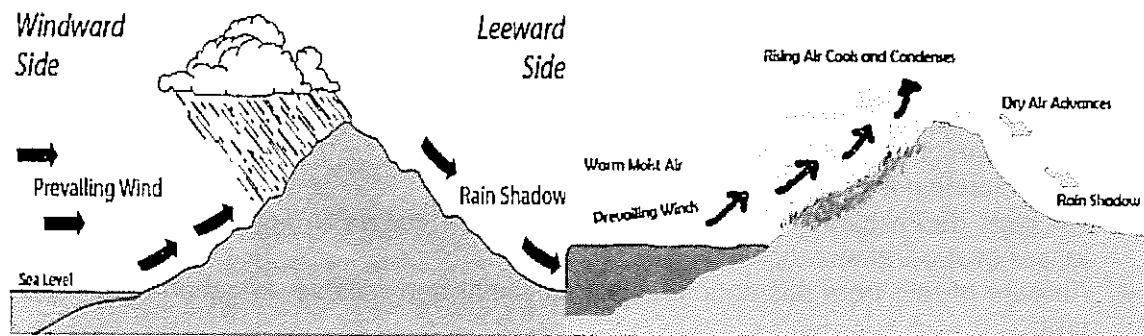
(III) Thunderstorms caused by the convectional currents





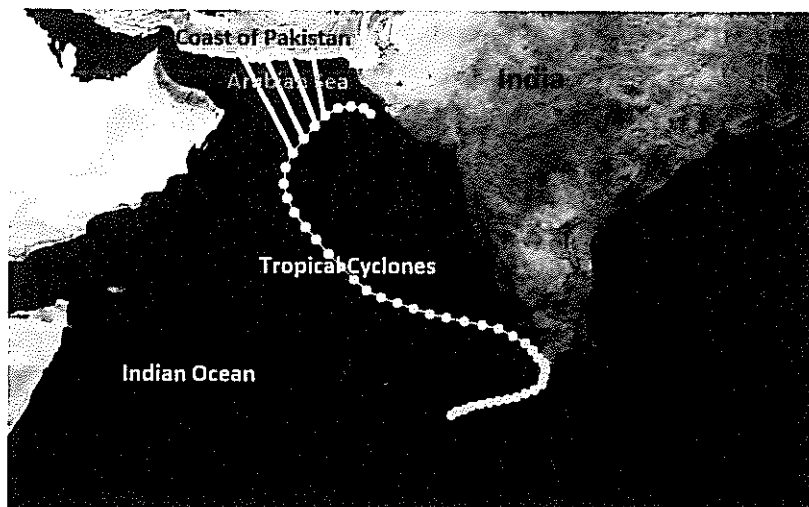
- Pre-Monsoon (April-June) and post-Monsoon (October-November) seasons.
- Mainly pre-Monsoon source causes rainfall.
- Start of Summer; hot air with moisture rises suddenly; reaches height, causing thermal instability that in turn causes stormy winds.
- Condensation at a significant height.
- Stormy winds and heavy shower of short duration, mainly in northern parts of Pakistan, from mountains areas to the upper Indus plain.
- Southern parts remain deprived of this type of rain, due to the temperature inversion
- Temperature inversion in south-eastern and south-western parts of Pakistan; hot air rises to a good height but fails to get condensed.
- Returns simply as warm air; no rain.
- Post-Monsoon winds do not bring sufficient rain as October-November are generally the driest months.

(IV) Relief Rainfall



- Many northern mountainous areas receive it.
- Related to relief / height/ hill slope.
- Moist, unstable air strikes hill slope, rises to get condensed; rainfall occurs.
- Murree and neighboring areas receive it.
- Rainfall on the windward slope, but on the leeward slope, only dry, warm and sinking air; little or no rainfall.
- Gilgit-Chitral and Quetta valley are main rain shadow areas.

(V) Tropical Cyclones



- Violent stormy winds originating from the Arabian Sea; rarely reach Pakistani coastal areas; most are diverted towards Indian coast.
- If hit Pakistan, a few hours of heavy rain with destructive stormy winds
- Cause damage to the fishing communities on the coast, especially the Indus Delta coast, crops, livestock, mud houses and power and communication lines in the Indus Delta region.
- Unreliable and ineffective type of rain.

Effectiveness of Rainfall

- Generally , ineffective rain
- Monsoon: variable in amount, timing and distribution; less useful for agriculture; irrigation is needed
- High summer temperatures; more evapo-transpiration than absorption of rain.
- Heavy Monsoon showers; greater degree of surface run off and floods; little absorption of rain by land.
- Crop planning is difficult
- Western depression, relatively more useful; rain comes in light showers and also, lesser evapo-transpiration.
- Amount of rain from this source is not sufficient and reliable; irrigation is needed for crops.

D: Effects of Climate on life and economy in different zones:

i) Highland Zone:

- Sub-freezing winter temperature restricts many economic activities
- Snow covers grass, agriculture farms; rivers, lakes get frozen.
- People stay indoors, busy in carpet weaving, pottery and clay work etc.
- Many herdsmen migrate seasonally: Transhumance; moving to plain areas in winters along with herds of livestock; return to highlands in summers.
- Limited development and jobs due to rugged topography and harsh winters.
- Southwards and westwards some increase in economic activity and population density.
- Valleys of Peshawar and Quetta are big towns.
- Elsewhere, barren mountains, limited development and jobs; low population density.
- Lesser water suppliers in Balochistan plateau; difficult life.
- Fruit farming and terrace farming in many parts of northern mountains, and high altitude valleys of western mountains.
- Many nomadic tribes keep moving in search of food, fodder and water: semi nomadic way of life.

ii) Arid Zone:

- Very low rainfall, hot to very hot summers and mild to cool winters in Thar and Kharan deserts.
- Nomadic tribes, e.g. Pathans, Balochi, Brahvi etc keep migrating
- Settled communities make arrangements for storing rain water and use Karez irrigation.
- Karez is practiced in oases of Balochistan to irrigate fruit farms.
- Many desert areas in Punjab and Sindh have been reclaimed by perennial canals from the IRS (Indus River System).
- Inhabitants of deserts make arrangements to fight hot, stormy winds, e.g. thick, rough clothes, turban etc.

iii) Lowland/Semi Arid Zone

- Mainly Punjab and Sindh.
- Monsoon rain supports Kharif (summer) crops: rice, cotton and sugarcane.
- Both provinces economically most productive due to flat land and Monsoon rain.
- Rain from Western depressions good for Rabi crops, e.g. wheat, grams.

- Also, other crops e.g., pulses, vegetables grown on large scale.
- Most of major cities in Punjab and Sindh
- Availability of flat land with tolerable continental climate results in high population density.
- All sorts of economic activity: crop farming, livestock farming, secondary and tertiary industries, and transport have flourished.

iv) Coastal/Humid Zone

- Deltaic plain in Sindh (Indus Delta Coast) and hilly Makran Coast in Balochistan.
- Maritime/Coastal climate supports various economic activities, especially trade and factory industry, but only Karachi has availed this favouring factor.
- November-February: tourists are attracted to Karachi.
- Several large scale industries in Karachi.
- Fishing industry and a developed port provide further jobs.
- Karachi is well connected to other cities by roads and railways.
- Tropical cyclones create difficulties for the fishing community, damage infrastructure and crops in the low-lying Delta areas.
- Low rainfall on both coasts but creates more problems in Makran coast area; drinking water is supplied from reservoirs.
- Moderate climate is a helping factor in the development of the Gwadar Project.
- Human factors seem to be more important than physical (land and climate) ones as far as economic activities on coastal areas are concerned.

Life and Economy in the Desert

- Vast Thar desert of 22,000 sq km, in south-eastern Pakistan.
- A number of limiting and helping factors determine human activity in Thar desert.

Limiting factors/Disadvantages:

Very hot summers; hot and dusty winds; very low rainfall (some rain July-September, from secondary Monsoon); long dry spells causing "permanent drought like" conditions; higher rate of evapo-transpiration; shortage of water, food, fodder crops; danger to the health of livestock and humans.

Helping Factors/Advantages:

- Sandy soil with fine clay and silt-particles is used to grow crops.
- Rain water can be stored in a variety of ways, e.g.: traditional wells, earthen jars, bunds, pits, underground tanks, roofs of "Pucca" (Concrete – built) houses.
- With little rainfall people grow various crops, e.g. cereals, chilies, onions, garlic, brinjal, wheat and fodder crops.
- Soft sandy soils and flat land to build perennial canals from the Indus.
- Traditional skills to rear livestock and make dairy products e.g., butter, milk, yoghurt.
- Huge mineral potential of coal and oil.
- Growth of natural vegetation whenever ample rain is received; human efforts can supplement this natural growth.

E: Drought – Shortage of water due to insufficient rainfall

Causes:

i) Natural Causes:

- Unreliability and variability of Monsoon rains (major source of rainfall) causes seasonal drought in Punjab and Sindh (provinces located in eastern part of Pakistan).
- Hot, dry winds rob off moisture in the air and reduce humidity level.
- Global climatic changes e.g. global warming, affect Pakistan's climate.

ii) Human Factors

- Deforestation on the foothills causes soil erosion and decreased transpiration (moisture from trees given to atmosphere) and thus decreases rainfall.
- Overgrazing of land leads to soil erosion and reduced fertility of soil.
- Poor management of water resources; loss of water by seepage through the unlined canals and waste of water by farmers; unfair distribution of water between provinces (the Indus River system feeds KPK, Punjab and Sindh and thus there are disputes between these provinces on their due share (e.g. Sindh complains over a reduced water supply due to construction of reservoirs upstream of Indus)

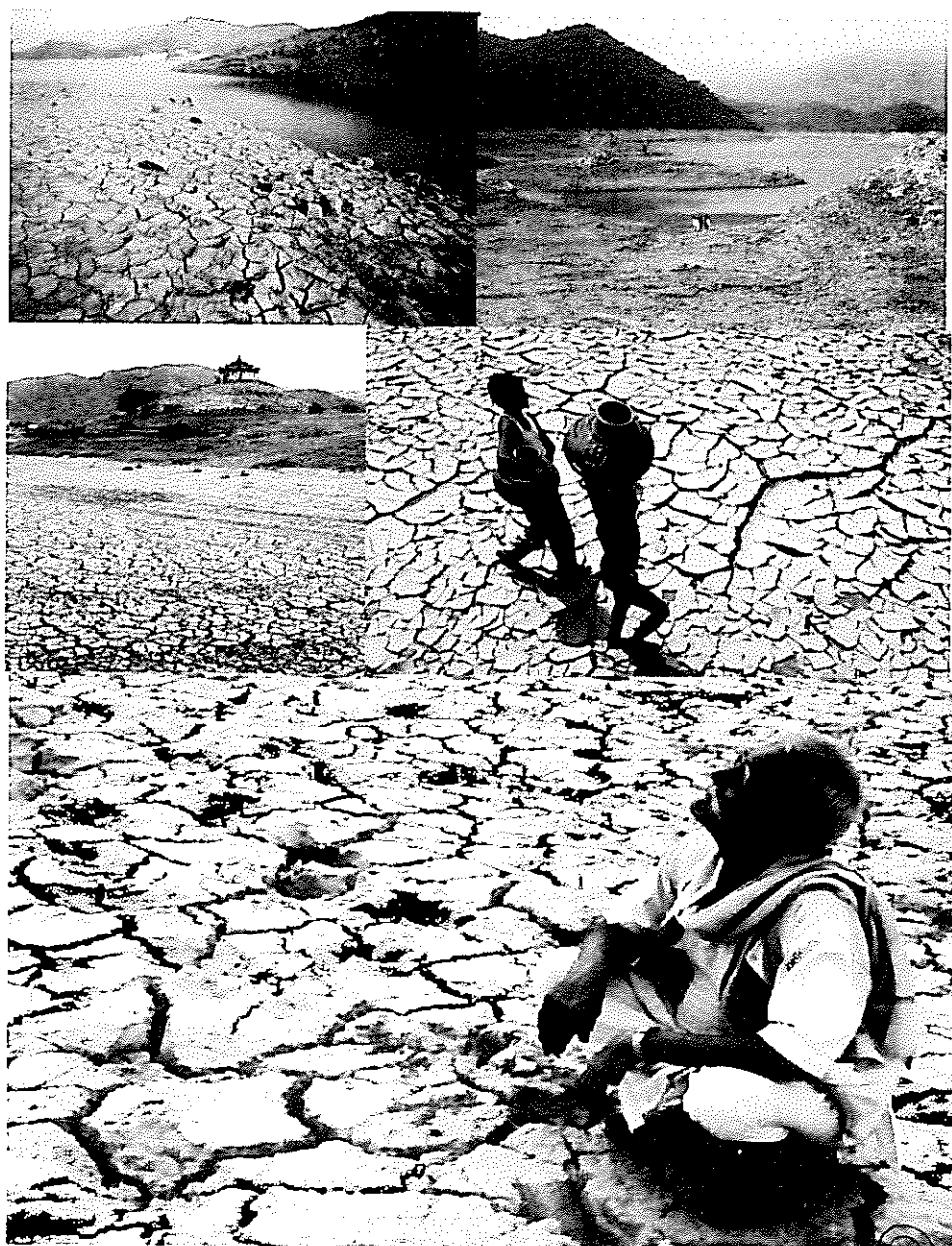
Types of Drought

- i) Permanent drought:** Serious shortage of rain to an extent that crop cultivation not possible without irrigation e.g. Thar, Cholistan and Kharan (Balochistan) deserts.
- ii) Seasonal drought:** Well defined rainy season (with good amount of rain) and dry seasons e.g. Potwar plateau where Barani (rain fed) farming is practised and southern Punjab.
- iii) Invisible drought:** Water deficiency not serious enough for crop cultivation, though crop yield is reduced.
- iv) Unpredictable drought:** May hit otherwise humid areas with good annual and seasonal rainfall; in this case, there may be unpredictable and abnormally low rainfall.

Effects of Drought

i) On physical environment:

- Desertification of fertile areas due to: soil erosion, dust storms (without rainfall), raised temperature, loss of vegetation, serious threat to various livestock species and encroaching of nearby desert areas upon the drought-affected areas.
- Drying up of water channels, e.g. lakes, rivers, streams due to higher rate of evaporation and lesser rainfall
- Drastic effects on fisheries and other aquatic organisms; unusual growth of algae; contaminated water.
- Lowered water table and less water to support plant growth and satisfy human needs.



Photographs of Droughts

ii) On Human Environment

- Malnutrition due to lesser availability of food and water, starvation and diseases related to water deficiency
- Migration of the affectees to better places, and this shatters rural social set up
- Many people from the affected areas are forced to live a nomadic life.
- Serious difficulties for farmers due to decline in crop yield, closure of Karez in Balochistan, and death of livestock.
- Shortage of raw materials to agro-based industries, reduced industrial output and exports; lesser foreign exchange earnings.
- More spending on imports, more loans lead to serious economic difficulties.

Drought Management

i) Storage of available water

- Building more reservoirs and traditional devices, e.g., tanks, wells, canals.
- Reservoirs to store water of rivers of Balochistan as lot of water is wasted from these rivers.
- Similarly, new reservoirs along the IRS (Indus River System) to store water of Monsoon rains.

ii) Using new Technology and Techniques:

- Installing desalination plants to purify sea water (recently, one is being built in Karachi).
- Recycling, filtration and chemical treatment of waste and sewerage water to meet growing needs
- Growing drought-resistant crops and those that need less water, e.g., oilseeds.

iii) Scientific management of water resources:

- Training farmers to make judicious use of water; lining of canals to prevent water loss through seepage and finding lasting solutions to the problems of water logging and salinity.
- Resolving inter-provincial disputes over distribution of water.
- Creating awareness among people and avoiding waste of water; use water methodically.

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CHAPTER 03

DEVELOPMENT OF WATER RESOURCES

Two Main Sources:

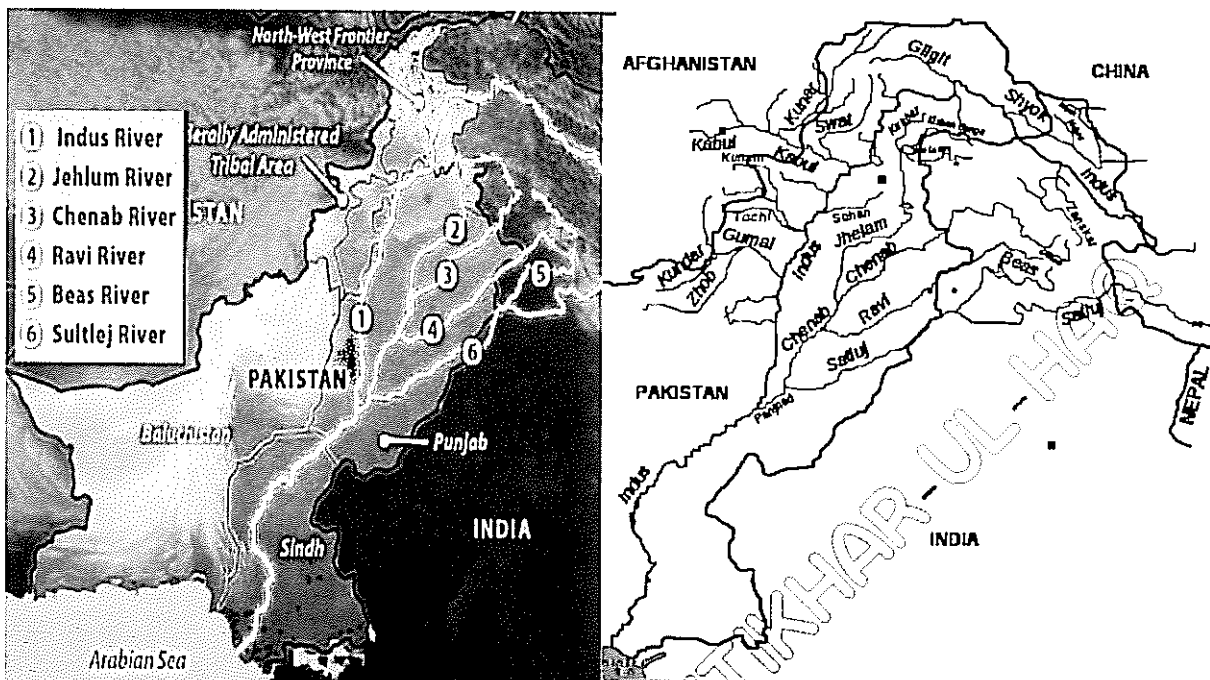
- 1: Surface Water in the form of rivers, lakes, ponds etc.
- 2: Ground water that is to be pumped out to the land surface exploited in Pakistan by shallow wells, tube-wells and the Karez System. The water table is not constant but fluctuates due to seasonal and regional factors. It may be sweet/fresh near the sources of recharge: rivers and major canals; but becomes saline away from such water channels.

River Systems of Pakistan

There are two river systems in Pakistan that include the Indus River System and the rivers of Balochistan.

THE INDUS RIVER SYSTEM (IRS):

- The Indus is watered by glaciers of the Karakorum and Hindu Kush Ranges.
- The Jhelum, Chenab, Ravi, Sutlej and Beas are the main eastern tributaries of the Indus.
- All the eastern tributaries join together by the time Sutlej joins the Chenab at Panjnad to become the river Panjnad, which then joins the Indus near Mithankot.
- The river Indus has the highest mean monthly discharge in June and July.
- The rivers to the west of the Indus are smaller in length and width and have less water than the eastern tributaries.



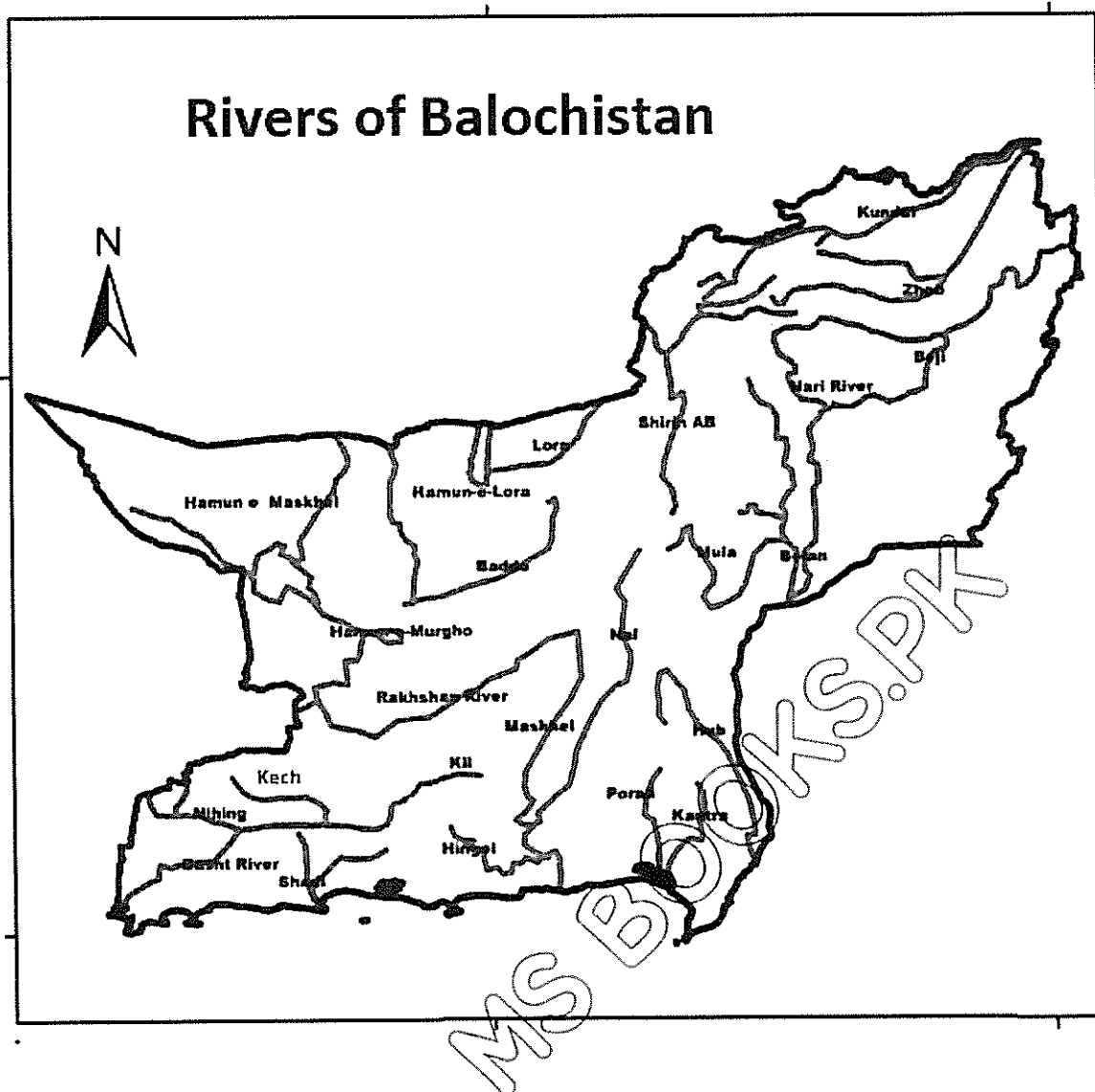
IRS: Indus River System

- 1: Eastern Tributaries of Indus
- 2: Western Tributaries of Indus

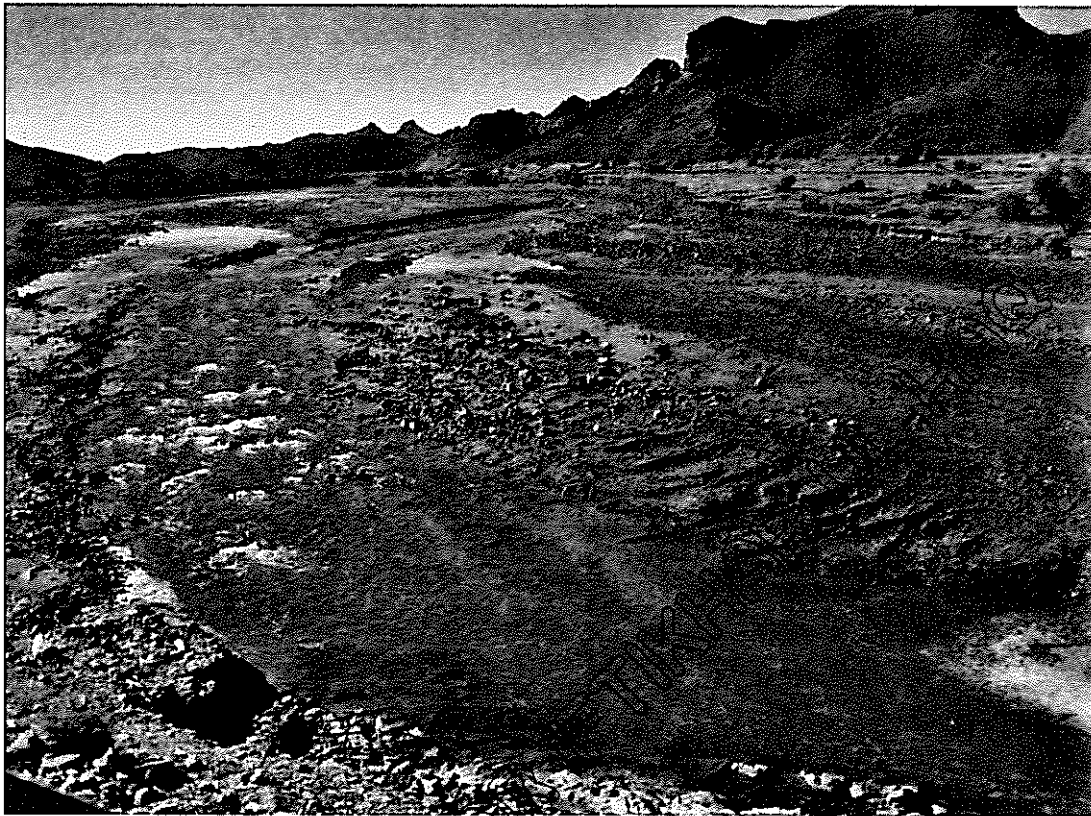
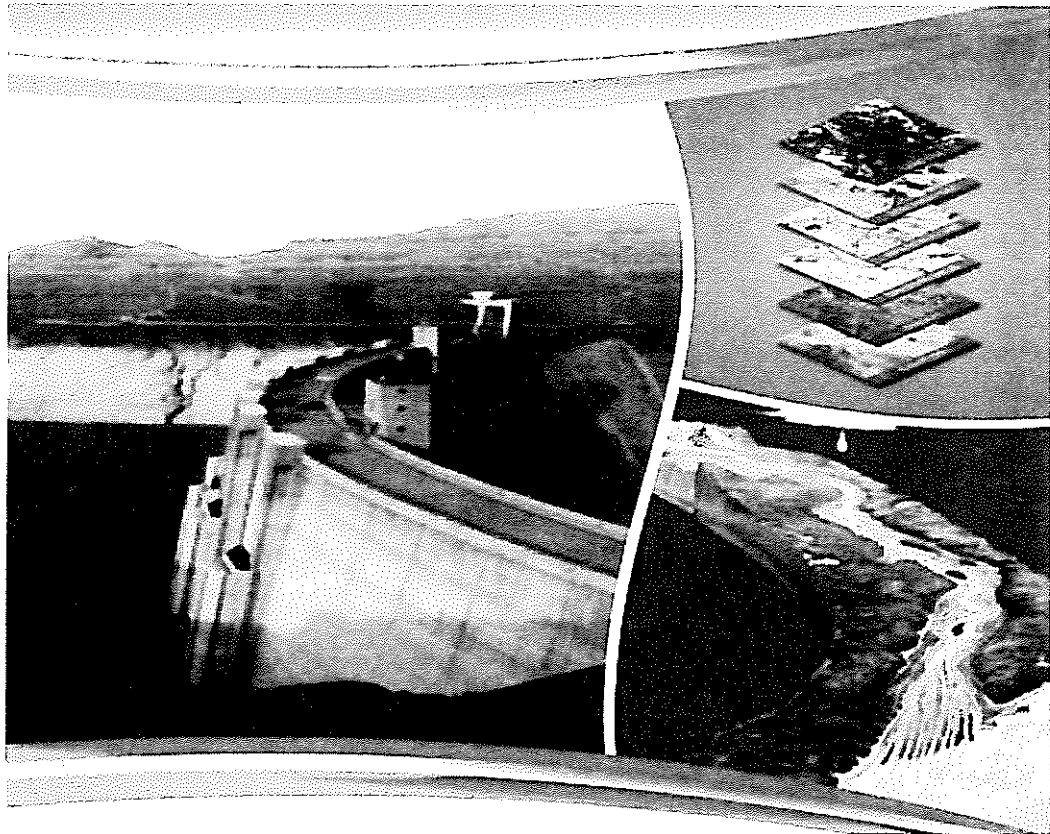
RIVERS OF BALOCHISTAN:

- Quetta being a high altitude region has the central position in the drainage pattern of Balochistan.
- Rivers like the Zhob, Khandar, and the Kalachi drain into river Indus because they flow eastwards.
- The rivers Loralai, Chakar, Bolan and Mula are absorbed into the Kachhi Sibi Plain.
- Some rivers like Hab, Porali, Dasht and Hingol drain into the Arabian Sea.
- There are many small rivers that flow westward and drain into shallow depressions called Hamuns.
- Rivers in Balochistan are much smaller than in the Indus River System.
- They normally flow only during the rainy season and most of the rivers remain dry for most of the year. They have little value as sources for irrigation.

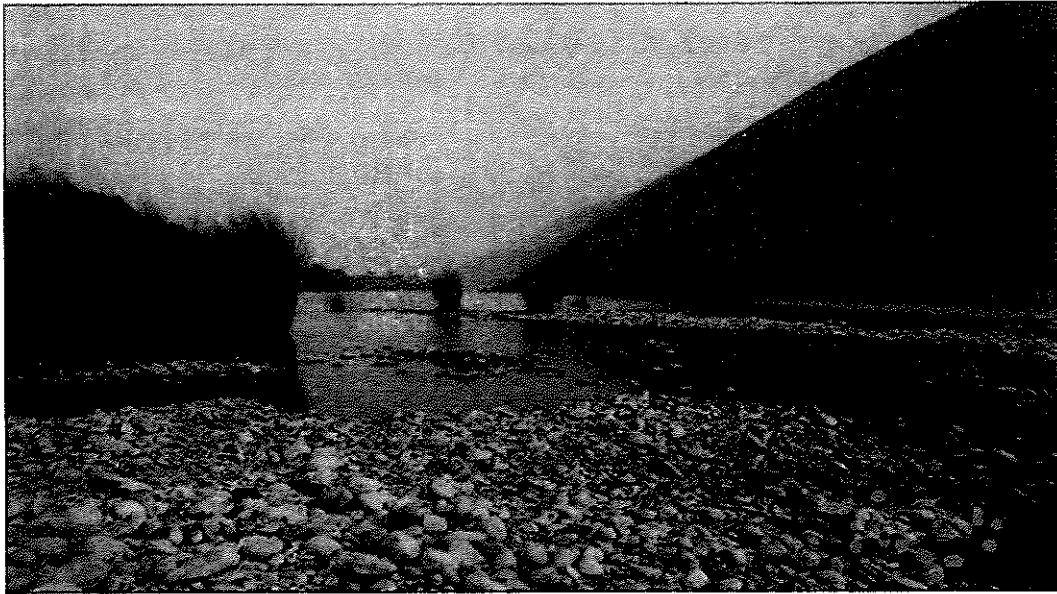
In Pakistan ground water resources are exploited by shallow wells, tube wells and the Karez system. In the desert areas ground water is difficult to obtain as the water-table is extremely low and the rate of evaporation is much higher. Ground water is extremely useful in areas where canal irrigation is not possible and rainfall is variable and scanty like most of Balochistan.



Balochistan Water Resources Development



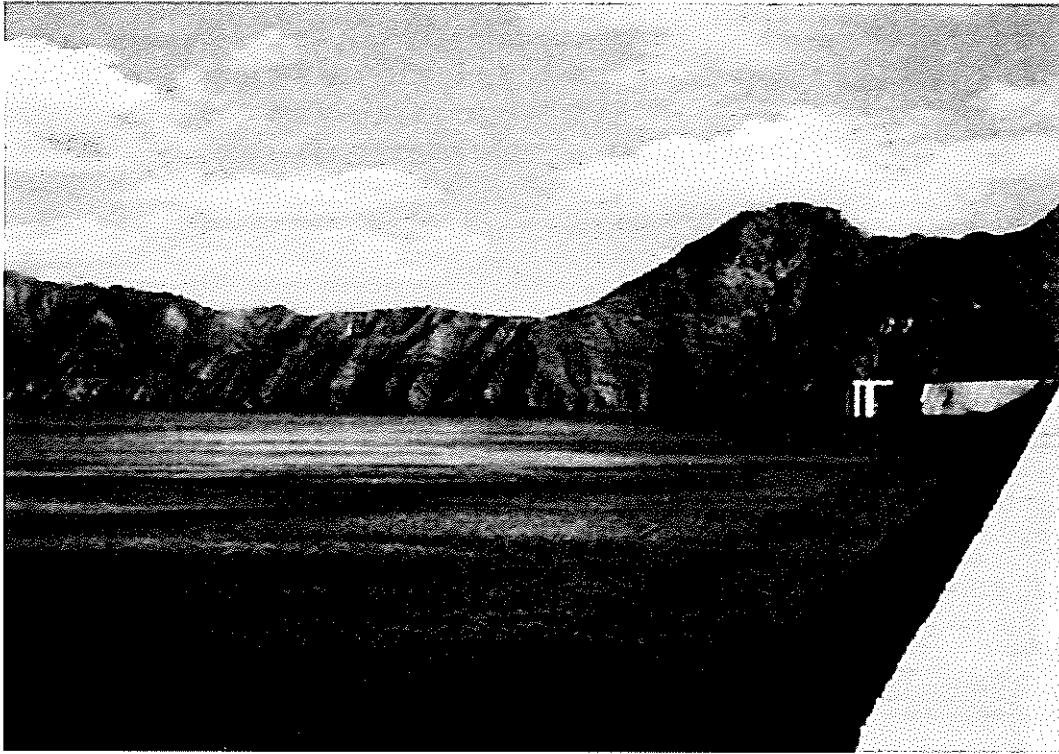
Zhob River in Northern Balochistan



Hub River in eastern most part of Makran Coast, Balochistan



Hub Dam



Dasht River: formed by the union of Kech and Nihang rivers in SW Balochistan

IMPORTANCE OF RIVERS TO PAKISTAN:

- Add to the scenic beauty
- Feed agriculture, especially arable/crop farming; bring and spread rich and fresh alluvium for crop cultivation
- Inundation/flood canals are taken out for subsistence farming
- Barrages and dams (reservoirs) are built across rivers; dams produce HEP
- Perennial canals taken off the reservoirs to irrigate large farms
- Source of inland fishing
- Human settlements on the alluvial terrace/ bar upland across a Doab

USES OF WATER:

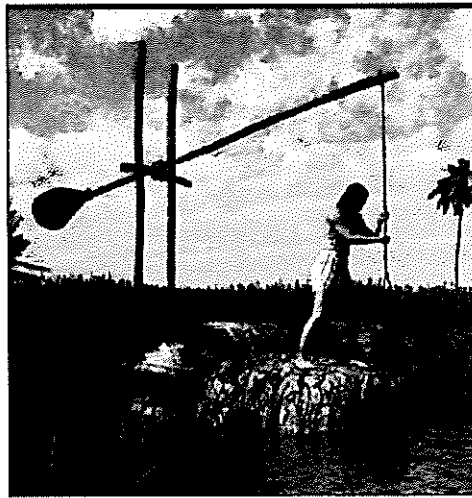
- The major uses of water agricultural, domestic and industrial.
- The most important use of water in Pakistan is for agriculture.
- Domestic uses of water include drinking, cooking, washing and sanitation.
- Water is required in almost all the industries. In some industries it is the raw material (soft drinks, juices etc.) but in other industries is used for cooling or washing purposes (cotton textile, leather and iron and steel industries).

IRRIGATION:

Need of Irrigation: Unreliable and variable Monsoon rainfall making it ineffective; irrigation is the artificial supply of water to the land to encourage plant growth. Pakistan's agriculture mainly depends on irrigation as rainfall is insufficient, unreliable and highly variable in amount, timing and distribution. Also, generally high temperatures cause more evapotranspiration (loss of moisture to atmosphere) than precipitation (absorption of moisture by land).

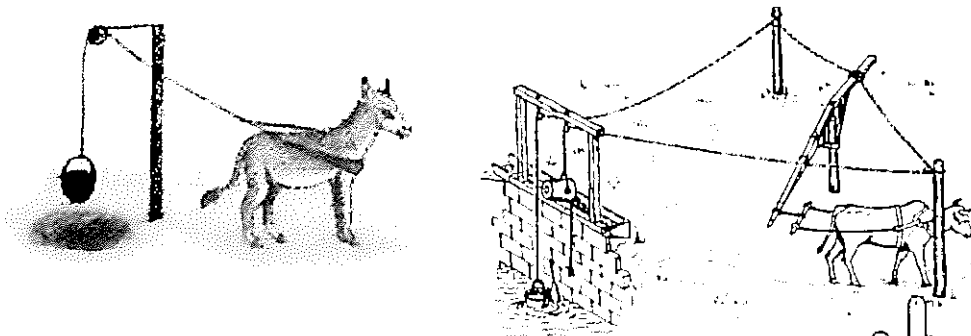
TRADITIONAL METHODS OF IRRIGATION:

1. SHADUF:



In the Shaduf system water is drawn from a well, river or canal by a bucket which is attached to a pole on one side and some heavy object on the other side. This system is rarely used today.

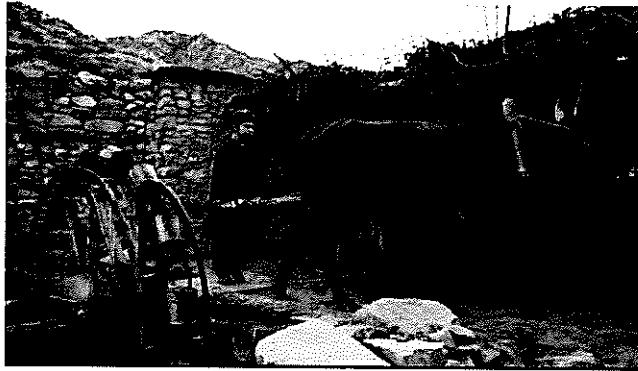
2. CHARSA:



It is an improvement upon Shaduf as animal/draught power replaces human power to pull water from a well.

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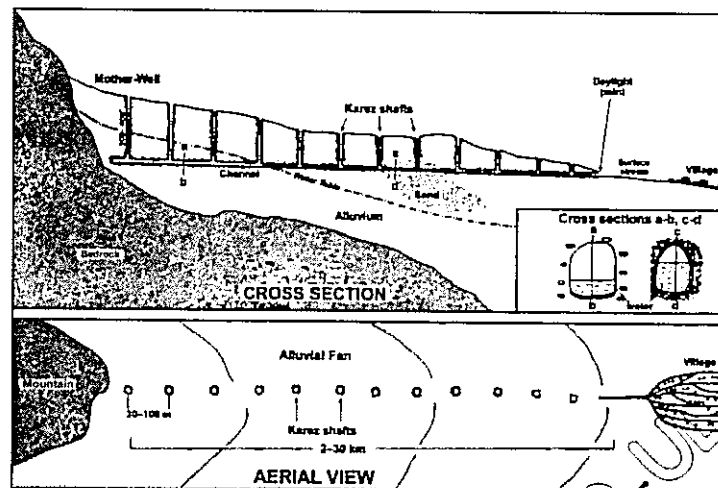
3. PERSIAN WHEEL:



This system provides continuous supply of water and irrigates comparatively larger areas as compared to Shaduf and Charsa. It comprises two wheels placed across a traditional well: one placed horizontally and the other vertically. An animal, e.g., a donkey, rotates the horizontal wheel that in turn rotates the vertical one. Several buckets are attached to the vertical wheel that are filled with water and brought out to be emptied into a narrow duct that opens in a farm.

4. KAREZ:

A Karez is an underground canal that begins from the foothills of mountains where water-table is relatively higher, and takes water to an orchard. The canal may be very long. There are vertical shafts present so that silt can be removed (desiltation). This method is comparatively costly as compared to other traditional methods.



Advantages:

- Suitable for fruit farms/orchards
- Minimum evaporation as it is kept underground.

Disadvantages:

- Expensive, usually owned by a group of farmers.
- Regular desiltation (removal of silt) required, making it more difficult to maintain.
- Not suitable for crop farming on large scale.

5. Flood/Inundation Canals:



Long canals that are taken off the large rivers to the farms. They are filled by flood water of rivers, especially when there is high flood. In the Northern Mountains/G.B. province, their counterparts are called diversion channels that are relatively narrower. They divert river water in the high valleys to feed subsistence crops that are grown in terraces (terrace farming).

6. Mud Tanks:



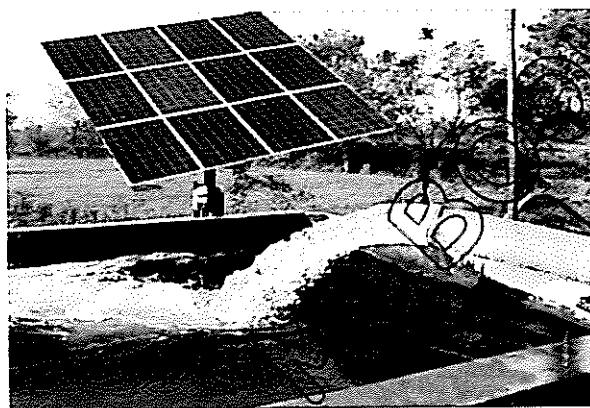
IRRIGATION TANKS



They are built across small streams in the form of a small reservoir. They collect excess water in the rainy season. Not efficient due to unreliable rainfall.

Modern Irrigation Methods:

1. TUBE WELLS:



Advantages:

- Can be built in the flat land of the Indus plains and valleys of KPK.
- Natural NE/north-east to SW/south-west slope of Pakistan's land, soft soils of the Indus plains and the IRS are helping factors to build them.
- Provide water throughout the year.
- No huge running cost; only initial cost is big.
- No electricity/diesel/animal power needed.

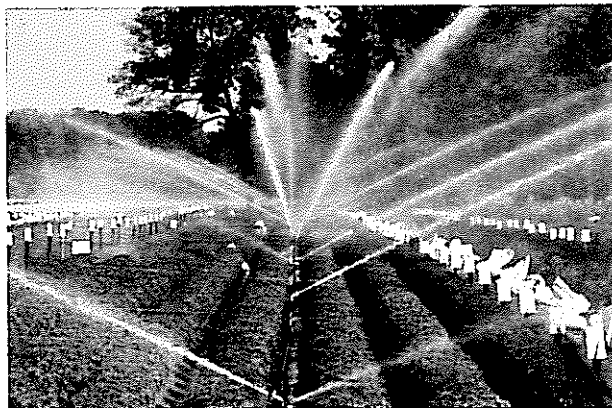
Disadvantages:

- Heavy investment needed for building.
- Problems of water logging and salinity if canal banks are left unlined.
- Loss of water due to evaporation if kept open throughout the year.
- Not affordable by subsistence farmers.
- Can't be built in rugged areas.

3. TANKER:

- The automobile water tankers in emergencies only.
- They are more suitable for parks and linear plantation along roads and canal banks e.g., for Lahore Canal.

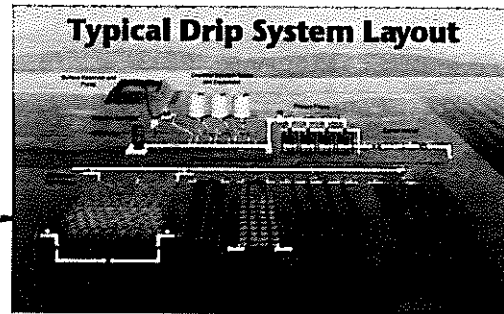
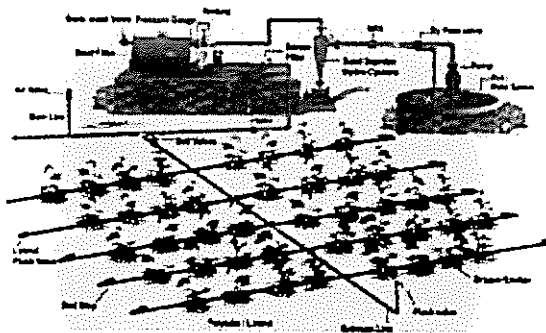
4. SPRINKLERS/ Micro-irrigation:



- It is centrally placed, punctured device, connected to the public water supply.
- It releases water under pressure to irrigate a very small area.
- It is not suitable for large farms but mainly for house lawns and public parks.

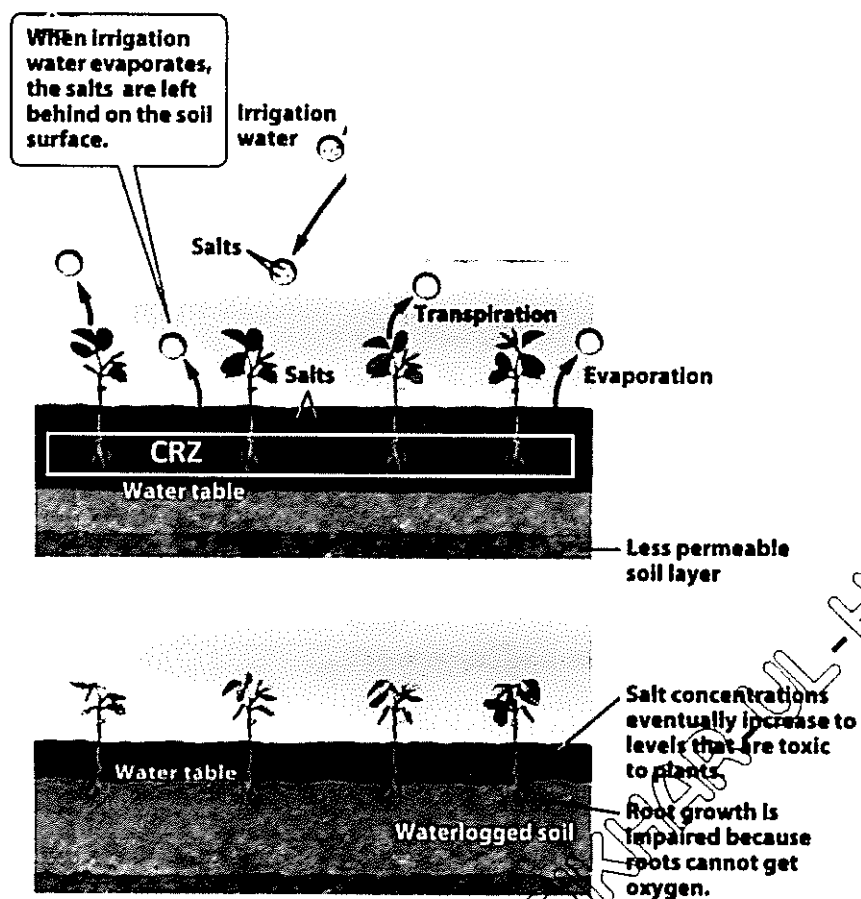
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5. Drip/Trickle/Micro-irrigation:



- It is another, larger version of sprinklers and it comprises a large network of tubes with holes to release calculated amount of water.
- It is highly economical as it saves water loss and water is directed towards selected parts of the crops.
- In experimental phase in Pakistan though popular in many Middle Eastern states.

PROBLEMS OF WATER LOGGING AND SALINITY:





- Water seeps through unlined banks of canals then it reaches the crop root zone and damages the soil.
- This raises the water table: water logging.
- As water reaches the land surfaces, it evaporates and salts are left behind.
- This condition is called salinity in which white salty patches appear on affected land.
- Both water logging and salinity damage the soil permanently unless they have been eradicated.

Effects:

- Serious damage to soils.
- Infertility of soils: no crops can be grown in the affected soils.
- Poor crop yield.
- Poor farm income: poverty for farmers.
- Adverse effects on the agro-based industries: reduced supply of raw materials, e.g., raw cotton to industries and so, less industrial production.
- Lesser export earning: reduced GDP (Gross Domestic Product) and GNP (Gross National Product).
- Additional cost of treating the problems.

Solution of the Problem:

- Under the SCARP (Salinity Control and Reclamation Program), these steps were taken:
 1. Lining of canals by bricks and cement.
 2. Periodic closure of canals.
 3. Lowering of water table by tube-wells and providing extra water to flush out salts from the soils.
 4. Planting eucalyptus trees as their roots absorb excess water and salts from the affected soils.
 5. Sprinkling gypsum in the salinised soils.
 6. Installing surface drains to divert surface water to a nearby river or lake.

Siltation in reservoirs:

Deposition of silt at bottom of reservoirs is called siltation.

CAUSES OF SILTATION:

- Routine soil erosion from the Northern Mountain ranges as the Indus River System flows down to the plains.
- Deforestation on foothills further accelerates the process of soil erosion by the rivers that bring silt from the Karakorum and Himalayas.
- Rivers carve out valleys between the mountains and while doing so, they carry plenty of soil/silt from these valleys.

EFFECTS:

- Capacity of reservoirs is reduced: less water stored for irrigation and HEP production
- Reservoirs' foundation is weakened as a huge heap of silt develops at the base of the reservoirs; possible serious damage to the dam in the long run.
- Choking of canals.
- Water supply pipes are choked.
- HEP machinery is damaged.

SOLUTIONS:

- Raising the height of the dams, e.g. Mangla dam being raised now.
- Install silt traps while constructing the reservoirs as they are very expensive afterwards.
- Afforestation and reafforestation schemes should be launched, while taking strict measures against deforestation.
- Make cemented banks of canals.
- Improving the regulatory mechanism of water flow: reducing flow during high flood season by sluices/gate valves in the reservoirs.

DIFFERENCES BETWEEN DAMS AND BARRAGES:

DAMS	BARRAGES
Multipurpose i.e. water storage for irrigation, prevention of floods as well as producing HEP.	Water storage for irrigation and prevention of floods.
Great height and depth.	Longer than dams but less higher.
Site requirements e.g. mountains etc.	No such requirements; may be built on plains as well.
High cost.	Low cost.

DIFFERENCES BETWEEN LARGE DAMS AND SMALL DAMS:

LARGE DAMS	SMALL DAMS
High cost, more area, better flood control, but require more population evacuation, more time required.	Less cost, less area and less effective flood control than large dams, less population displacement, lesser time for building them.
Water for commercial, industrial and domestic uses.	Provide water for commercial, industrial and domestic uses.
More chances of siltation; it is difficult and	It is easy to remove silt from small dams;

expensive to remove silt.	less siltation.
Usually multipurpose.	May or may not be multipurpose.
Less environmental friendly/eco-friendly: large scale deforestation needed, adverse effects on aquatic ecosystem, watersheds and rivers; damage may be irreversible.	Environmental friendly/eco-friendly: no large scale deforestation needed, no serious damage to rivers and ecosystem.
Strict site requirements: high mountains, steep sided deep valleys, cool climatic conditions and a huge storage area.	Can be built at any place, mountainous or plain areas.
Less popular in world.	More popular in world.

The IWT (Indus Water Treaty)

Background details:

- Division of Punjab in August 1947: Eastern or Indian Punjab and Western or Pakistani Punjab
- Headworks for the canals of Sutlej (Ferozpur) and Ravi (Madhupur) located/left in the Indian Punjab.
- A temporary agreement about the division of waters between India and Pakistan expired in March 1948.
- Indian threat to stop water flow to Pakistan from these headworks: possible disaster for Pakistan's agro-based economy.
- Jinnah persuaded India not to stop water flow altogether.
- Negotiations throughout the 1950's.
- Intervention of the WB (World Bank) and September 1960 the IWT was signed.

Results:

- 3 eastern rivers of the IRS given to India: Ravi, Sutlej and Beas.
- 3 western rivers with Pakistan: Indus, Jhelum and Chenab.
- Compensation to Pakistan by India, USA, UK, Germany and New Zealand to build: 2 large dams, 5 barrages, 1 gated syphon and 8 link canals (a canal connecting a western with an eastern river).
- Pakistan was expected to complete these projects by 1973, during this time period India would continue supply water from the headworks on the eastern rivers.
- A special body, WAPDA (Water and Power Development Authority) was created by Pakistan to supervise the construction projects.
- Dams: Mangla on Jhelum and Tarbela on Indus rivers.
- Barrages: Chashma, Rasul, Marala and Qadirabad.
- Link canals, e.g., Chashma-Jhelum and Marala-Ravi.
- The issue of the division of water of the IRS was a partial success as India in later years (1990's onwards) would violate the IWT to create problems for Pakistan and to keep it an international dispute, e.g., the Baglihar dam on River Chinab and the Kishan Ganga dam on River Jhelum.

Water Pollution:

Sources

- Dumping/disposal of untreated domestic and industrial waste.
- No effective and well planned systems for treating industrial waste.
- Polluted water from several major industries in Karachi, Lahore, Faisalabad and other towns is released in a callous way to the water supplies or open drains that eventually discharge into fresh water channels: rivers, streams etc.
- Highly polluted water from leather tanneries is also usually released similarly.
- Excessive use of chemicals by the agriculture sector: chemical fertilizers, insecticides and pesticides; these eventually become part of fresh water supplies.
- Chemical fertilizers stimulate growth of tiny plants like algae, a process known as eutrophication, that indirectly promotes water pollution as the marine life is endangered due to poor exposure to the sun and lack of oxygen.
- Oil spill/slick from oil tankers on the Kemari/Karachi port and the Port Qasim also causes water pollution.

Conflicting users of water resources:

A: Interprovincial conflicts:

- One major river, the Indus, passes through KPK, Punjab and Sindh.
- Interprovincial disputes as each province wants/claims greater share.
- Several reservoirs in Punjab, but most of the flooded areas in KPK.
- So, KPK claims share in water accordingly.
- Reservoirs in the KPK territory but Punjab gets greater share as it grows most of the agricultural crops and is the most populated province.
- Sindh becomes the tail end user as less silt is deposited on its floodplains; so, crop farming is affected.
- Evaporation further reduces fresh water supply to Sindh.
- Fear of heavy floods downstream of Indus (Sindh) by release of water during heavy floods.

B: Other conflicting users:

1. Domestic consumers: With rapid growth of population, growing demand of water for drinking, sanitation, cooking and washing.
2. Farming: Large scale irrigation needed due to ineffective and unreliable rainfall. Kharif crops like sugarcane and rice need plenty of water for higher yields and for better farm incomes.
3. Industries: Need of water for higher output to satisfy the domestic needs and to maintain/increase export earnings; growth of beverages/soft drinks industry due to growing needs and competition in quality.

C: International Water dispute between Pakistan and India:

- 1948-1960, conflict over the headworks of Pakistani rivers located in India.
- India closed the two headworks, Madhupur on Ravi and Ferozepur of Sutlej rivers.
- 1960, the IWT resolved the conflict but in later years India began to violate it by announcing to build reservoirs on the Jhelum (Kishan-Ganga Dam) and Chenab (Baglihar Dam) rivers.
- Vulnerable position of Pakistan as except for Indus, all its eastern tributaries come through the Indian territory to Pakistan; also, Pakistan has failed to build more dams during the last 3-4 decades.

Conservation and Management of Water Resources:

- Adopting a long term, comprehensive and effective strategy to control water pollution.
- Enforcing strict laws to treat industrial waste.
- Developing a sophisticated sewerage system.
- Creating awareness among people to minimize waste of water.
- Resolving the inter-provincial water dispute: KPK, Punjab and Sindh have constant dispute over the IRS as Punjab needs a greater amount of water for its agricultural and industrial needs whereas the other two smaller provinces blame Punjab for depriving them of their due share of water.
- Making IRSA (Indus River System Authority) more effective and taking more steps like the Water Apportionment Accord (1991).
- Making more reservoirs, both large and small dams as there is no dispute on constructions of small dams.
- Resolving the water division issue with India through dialogue and by promoting trade relations.
- Preventing water logging and salinity.
- Overcoming the issue of mismanagement of water resources.
- Strict laws and measures against deforestation so that the number of rainy days could be increased and soil erosion and siltation in reservoirs could be reduced.
- Long term planning to deal with the challenge of global climatic change: global warming, drought and the Greenhouse effects caused by the CFC's (Chloro-Floro-Carbon) that are an essential component of modern electronic devices and industrial processes.

Q.1 Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Statement A	Statement B
Several small dams should be built in all provinces of Pakistan as it's less expensive and easier to build them.	Large dams are the need of the time due to a serious power and water shortage crisis.

Note: Agree with one statement MORE while referring to its advantages; also refer to the other statement by briefly explaining its advantage/disadvantages.

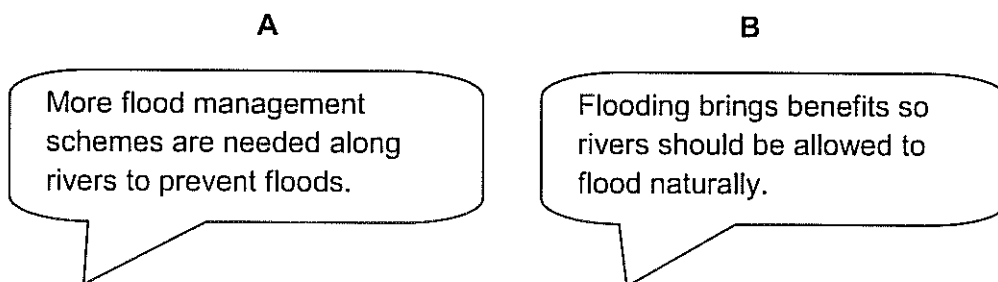
Ans. Large dams have greater capacity to store water for irrigation and HEP production. However, due to huge capital investment, deforestation, displacement of population and inter-provincial water conflicts, building major dams is a difficult task in Pakistan. A lot of work on the Kalabagh Dam has already been done since the 1980's. Therefore, it will be wise to build small dams because it does not require heavily paid foreign consultants and huge construction expenses. There are plenty of sites in Pakistan where they can be and are being set up, e.g., a dam on River Dasht, (Balochistan) and another on Lake Satpara (GB province). Loss of rain water can be minimized by storing it in small reservoirs. Siltation is also nominal and curable. Small scale power plants can also be set up that may be made independent of the National Grid. This way, the issue of both water and power deficiency may be resolved. Pakistan should, therefore, try to decentralize the power distribution system so that many small dams can be easily built.

Q.2 To what extent can Pakistan ensure sustainability of its water resources? (6)

Note: Refer to both HELPING and HINDERING factors/successes and failures.

Ans. Many small dams can be built on the IRS at multiple sites. The Neelum-Jhelum dam on River Jhelum and Bhasha dam on River Indus may be completed on emergency grounds. All unlined canals should be lined with bricks and cement to prevent seepage of water. SCARP (Salinity Control and Reclamation Program) like projects may be started to treat water logging and salinity. Waste treatment plants may be installed in major towns to treat domestic and industrial waste by such institutions as SWM (Solid Waste Management). The NGO's (Non-Governmental Organizations) may be encouraged to help the government efforts. A massive campaign may be launched to create awareness among people to stop waste of water. However, all this requires strong political will, political stability, huge funds and involvement of the people. Lack of awareness and poor literacy rate are also limiting factors. Pakistan needs to create harmony between all provinces for the serious issues of building more reservoirs. For this, efforts should be made to find a political solution instead of using force against the dissenting provinces.

(d) Rivers are an important resource for human settlement and economic activity, but flooding is an increasing problem which can hinder development. Read the following two views about ways to manage flooding in Pakistan:



Which view do you agree with more? Give reasons to support your answer and refer to examples you have studied. You should consider View A and View B in your answer. [6]

Ans. Though building more flood management schemes involve huge expenses and deforestation to get a clear land, they are essential for the people and economy of Pakistan. Big reservoirs prevent many losses that include damage to houses, farms and factories. Relief and rehabilitation services require huge sums of money that may create more problems for the indebted state of Pakistan. Frequent and destructive floods hamper with development projects on one hand, and loss of days of work in Industry and business, and study in educational institutes, on the other. The government has to levy more taxes to make up the losses caused by this vicious cycle. At the same time, if rivers are allowed to flood naturally, they enrich soils of the floodplains by adding nutrients to them. This ensures an improved yield the following year. Some floodplains can be used for establishing fish farms in several parts of Pakistan that will satisfy the growing needs of better quality food by growing population. More water will be available for raising a low water table and feeding irrigation canals. To conclude, a comprehensive strategy is required to build flood management schemes like Bhasha Damir Dam. Moreover, Kalabagh Dam project should be revitalized by overcoming interprovincial water conflicts so that a serious power and water shortage crisis may be overcome with long term benefits.

CHAPTER 04

FORESTS

2 main types: Productive (natural) and Protective (usually man made/irrigated) forests

GEOGRAPHICAL TYPES:

1. ALPINE:



- They are found at greater heights, near the snow line: upper parts of the GB province.
- They are short trees because of poor exposure to the sun, heavy snowfall and very low/sub-freezing temperatures.
- They are used for firewood only.

2. CONIFEROUS:



- Extensively distributed in mountainous areas at heights lower than for Alpine forests: GB province, KPK, Upper Punjab (Islamabad to Murree) and north-western Balochistan (Quetta and Ziarat valley areas).
- Special adaptation features allow them to survive at low temperatures and mountainous areas:
 - i. Tall rounded trunks to reach out for the sun.
 - ii. Firmly held roots to ensure survival against winds.
 - iii. Downward sloping branches to prevent snow accumulation.

- iv. Cone shaped covering of fruit to protect the seeds.
- v. Thin needle shaped leaves to reduce water loss through transpiration.
- vi. Resinous barks that cannot be taken away by stormy winds.

Uses:

- i. Provide wood for various industries e.g. timber for furniture and construction industries (e.g., Shishum) or for making match boxes.
- ii. Provide natural habitat for wild life.
- iii. Add to scenic beauty of the environment.
- iv. Also reduce pollution and lower temperature and provide firewood.
- v. Attract rain: the Murree and Galiat region is the highest rainfall area of Pakistan due to thick forest.
- vi. Act as the first line of defence against floods on the hill slopes; thus reduce soil erosion, landslides and subsequent siltation in reservoirs.

3. RIVERINE/ BELA:



- Found along Indus and its tributaries, as linear plantation.
- High yielding commercial hardwood varieties.

Uses:

- i. Check over flow of river.
- ii. Strengthen the soil.
- iii. Provide wood for furniture and agricultural tools.

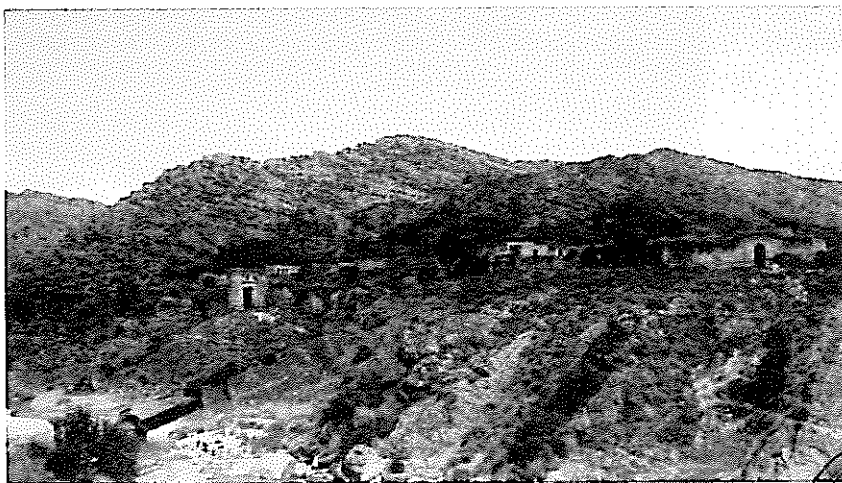
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4. TROPICAL THORN/DRY OR SCRUB FORESTS:



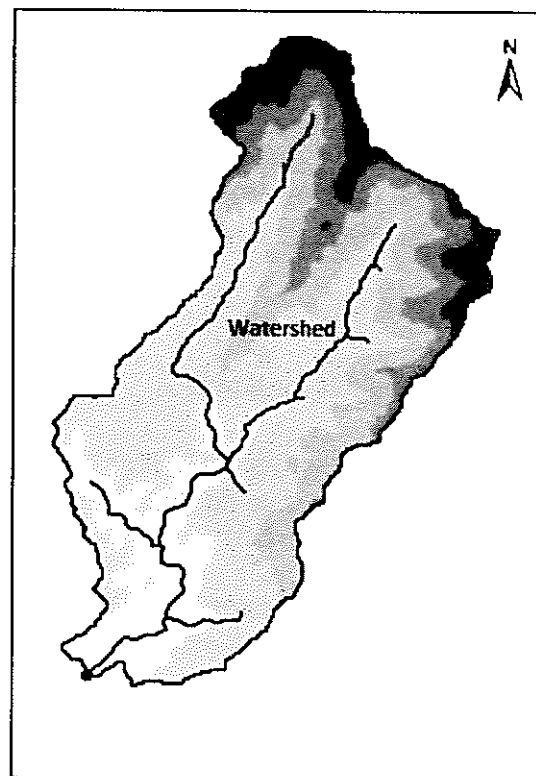
- Found in plains of Punjab and Sindh as well as parts of South West Balochistan.
- Have low height, thorny hardwood with deep roots.
- Scanty growth due to water deficiency; therefore, poor quality thorny wood.
- Used as firewood only.

5. SUB-TROPICAL DRY BUSH:



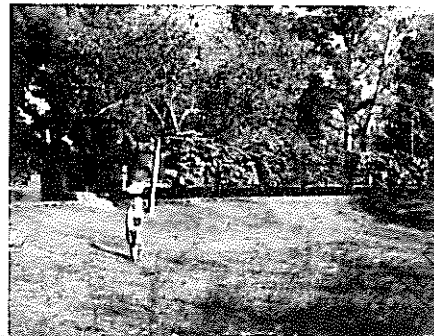
- Found on hills and foothills of Potwar region (lower Himalayas), Suleiman and Kirthar ranges, parts of Western Mountains (Waziristan, Peshawar, Kohat, Mardan) and above the Makran Coast Range.

Uses:



- i. Firewood and grazing purposes.
- ii. Protect the area of union of two rivers, i.e. they protect the watershed.

6. MAN-MADE/ IRRIGATED FORESTS:



Changa Manga Forests near Lahore

More Examples of Irrigated Forests

- Developed in several parts of Pakistan for example Changa Manga near Lahore, Jallo Forest at Lahore and as national parks elsewhere.
- Wan Bachran in the Thal area.
- Chichawatni (Sahiwal) and Ghulam Muhammad and Guddu Barrages.
- Shishum, Babul and Eucalyptus species are planted on large scale for commercial purposes.

Uses:

- i. Provide valuable species for timber.
- ii. Firewood.
- iii. Keep the environment clean and healthy; lower the local temperature.
- iv. Add to the scenic beauty, thus attracting tourists.

Disadvantages:

- I. Long term investment as most of the species take 5 to 15 years to grow fully.
- II. Limited value addition: mainly timber, furniture, sports goods industry.
- III. Lack of land for agriculture and industry due to growing population.
- IV. Problems of leaves especially during autumn, and roots as they grow haphazardly in all directions and may come out on the land surface.

7. MANGROVES:



- Found at the Indus Delta (Sindh Coast) and Hub Delta (Makran/Balochistan Coast).
- Have special features:
 - i. Roots are exposed and bathed by water of distributaries of Indus and the Arabian Sea.
 - ii. Have mechanism to filter out excess salt and that enables them to live in a mix of fresh (Indus) and salty (Arabian sea) water.
 - iii. Broad leaves with drip tips
 - iv. Leathery texture to reduce transpiration.
 - v. Low height and stunted growth, 6-8 m (average 3 m).

Uses:

- i. Used for firewood.
- ii. Provide timber to the coastal communities.
- iii. Leaves provide fodder for camels and nutrition to fish.
- iv. Check tidal waves, prevent erosion on the coast and absorb earthquake or Tsunami shocks.
- v. Provide habitat for fish and shrimps.
- vi. Provide breeding ground for fish and shrimps and also protect them from predators.

DEFORESTATION:



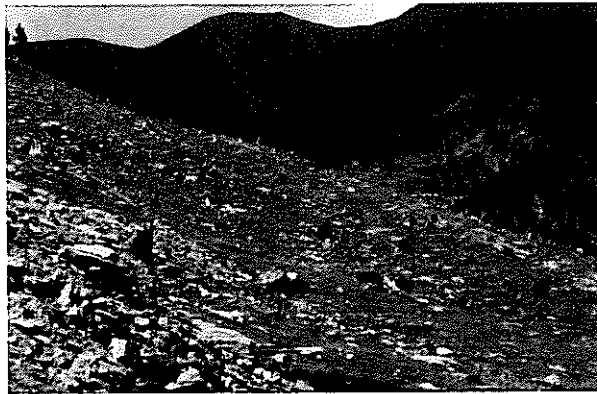
a scene of deforestation

CAUSES, EFFECTS AND SOLUTION

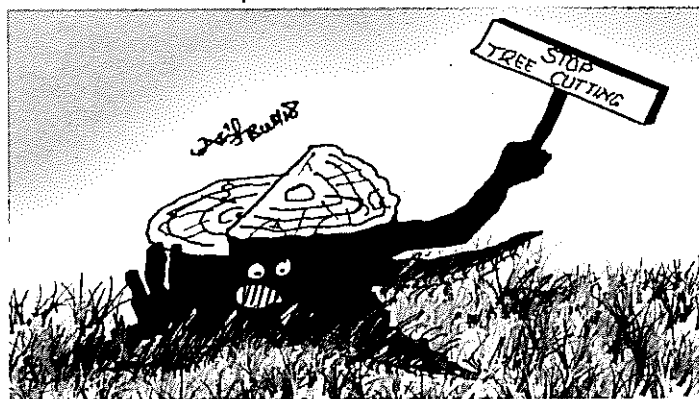
CAUSES OF DEFORESTATION:

- Clearance of land for: roads, houses, industries, growing crops, building reservoirs and for mining.
- Rapid pace of urbanization due to a very high population growth rate.
- Overgrazing by livestock: goats, sheep and cattle, especially on hills and foothills.
- Use of wood as fuel by about 50% of population, as natural gas has not been supplied to the people living in the mountainous, rural, tribal and low population density areas.
- Wood for various local and foreign industries e.g. sports goods, construction, truck bodies and boats.
- Illegal cutting of trees for local market and smuggling (mainly to Afghanistan); neglect by the concerned authorities further aggravates the problem.

EFFECTS OF DEFORESTATION:



Hill Slopes after Deforestation



A message against Deforestation

- Serious and harmful effects on environment: contribution to global warming as well as raised local temperature, lesser rains and more air pollution.
- Loss of scenic beauty, loss of tourists, loss of natural habitat and the threat of extinction of precious species of wild life: panthers, leopards, tigers etc., most of which have already been extinct.
- Soil erosion leads to siltation in reservoirs and so, less water is left for irrigation, leading to less crop yield and less water for HEP production also causes disruption of water supplies.
- Another effect is more surface run off which causes more destructive floods (effects on crops and lives of people).
- Due to soil erosion, more frequent and destructive landslides.

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SOLUTIONS TO THE PROBLEMS CAUSED BY DEFORESTATION:



Afforestation Projects in Pakistan

- Afforestation i.e. planting trees at new places and reafforestations i.e. planting trees to make up the loss of deforestation: e.g., the two afforestation schemes of the spring (March) and the Monsoon (July) should be made more effective.
- Discourage deforestation by creating awareness.
- Provide: (a) natural gas to forested areas and (b) irrigation to deforested areas to encourage plant growth.
- Plant selective species e.g. firewood species that people are allowed to cut down.
- Improve techniques of establishing and maintaining nurseries in all major and small towns.
- Improve working on forest management department by various means; these include:
 1. Strict enforcement of forest laws.
 2. Restricting use of heavy machinery, e.g., bulldozers in forest areas.

3. Launch urban forestry schemes i.e. regular afforestation campaigns, linear plantations along roads, canals etc.
 4. Start rural and mountainous forestry schemes e.g. terrace farming i.e. farming on flat patches on hill slopes, contour ploughing i.e. planting parallel to contours on slopes, and strip farming (strips of variety of crops in alternate rows) and fruit plantation on hill slopes.
 5. Ensure sustainable forestry: make arrangements for future generations to continue to avail forest reserves while present generations exploit the available reserves.
- Government should launch an aggressive campaign to create awareness among people about protecting forests and planting more trees: it should use electronic (radio and TV), newspapers and social media (facebook, twitter etc.) to encourage people for implementing the steps taken the by government.
 - Involve the NGO's (Non-Governmental Organizations) in the noble mission of protecting and growing forests; an example is the AKRSP (Agha Khan Rural Support Program) that sends volunteers to the GB province and neighbouring areas to train the local people in this regard.

Sample Questions:

Q.1 Which statement do you agree with more? Explain by referring to examples in Pakistan. (6)

Statement A:

While conserving natural vegetation, more irrigated forest should be developed in the Indus plains as only 2-3 % of Pakistan's land is covered with forests.

Statement B:

Growing forests is a long term project. Better use of plain areas is to grow crops and set up factory industries.

Note: Refer to both statements but agree with one MORE by giving its advantages; explain the other statement too by briefly referring to a couple of advantages/disadvantages.

Ans.

Deforestation is a serious issue. Aggressive tree planting schemes are vital to avoid its disastrous consequences. However, planting irrigated forests is a difficult and long term project. It requires a strict invigilation and follow up that is difficult to do in Pakistan. Moreover, the number of rainy days in Pakistan are constantly decreasing, making such projects more difficult. Therefore, it will be a wiser strategy to grow more food and cash

crops to feed the people and the agro-based industries like the cotton textile and food processing industries. Pakistan can enhance its export earnings by improving the quality of cotton textile products. This income may be utilized for setting up other large scale industries such as iron and steel, and heavy engineering plants. They produce more value added products such as construction material, machinery and equipment. Pakistan should urgently reactivate the PSM, near Karachi, and enlarge the HMC, Taxila while setting up more industries like them. The profits gained from these industrial units can be spent on large scale afforestation and reafforestation schemes so that a balanced strategy is possible.

Q.2 To what extent can the forested areas of Pakistan be conserved? [6]

Note: Refer to both helping and hindering factors/success and failures.

Ans.

The Government and the NGO's can launch several afforestation and reafforestation campaigns on large scale. Effective and well planned use of radio, TV, newspapers and the social media like the facebook, twitter etc. can play very important role in creating awareness among the people about the value of forests. Laws should be strictly enforced to stop deforestation in the mountainous regions where natural gas should be supplied or low value trees should be planted for firewood. The Forestry Department should be given more powers and better salaries should be given to its workers. However, lack of awareness and a low literacy rate limit the success of such schemes. Growing population, urbanization and industrialization are unavoidable factors. Also projects like the widening of the roads, Metro Bus and the Orange Line Train projects reflect poor planning and cause further deforestation. Pakistan can conserve and increase its forest wealth by enforcing strict laws and by involving various NGOs in more aggressive afforestation and re-afforestation schemes especially on the hillslopes.

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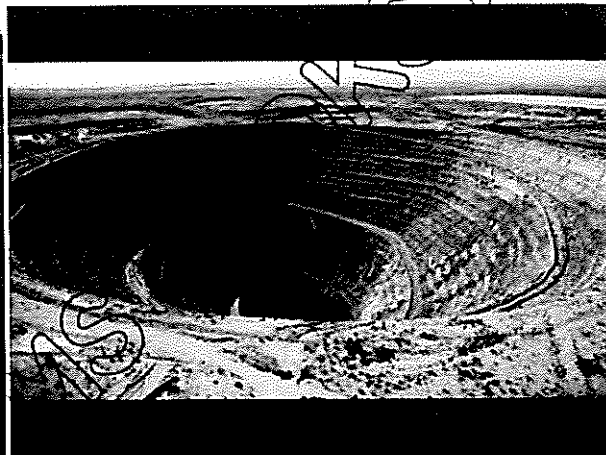
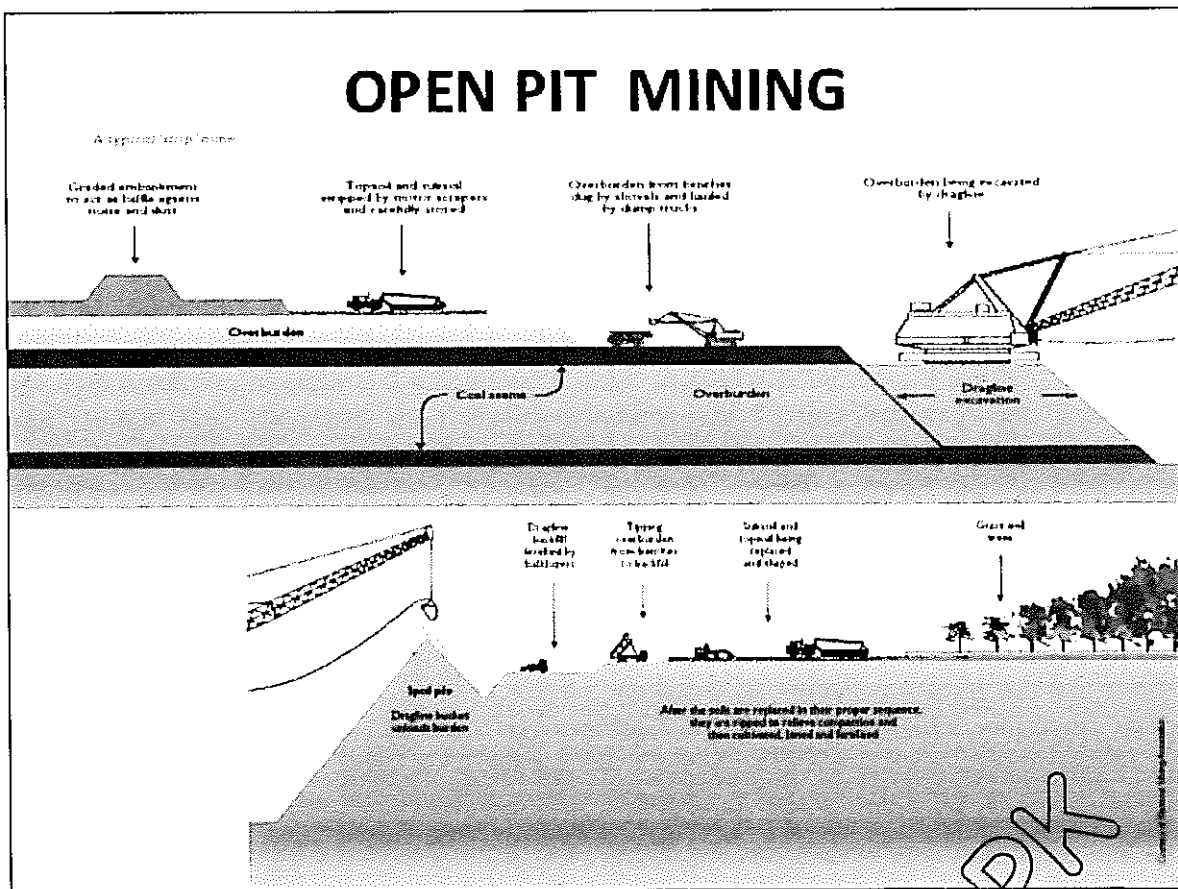
CHAPTER 05

MINERAL RESOURCES

MINING METHODS:

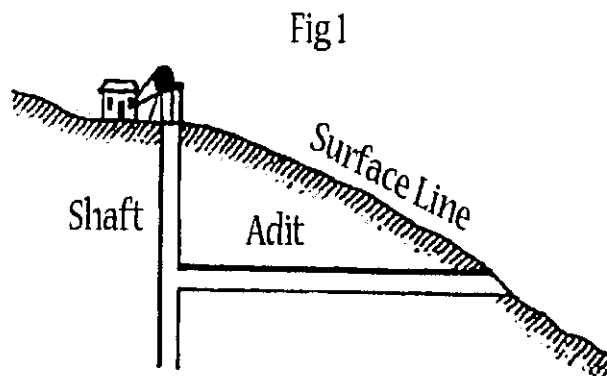
A. Open cast/ open pit mining:

- For minerals located near land surface. Digging is done using explosives etc to expose mineral bearing rocks; mineral is separated from the rock by variety of devices.
- Least dangerous method; coal from the Thar deposits is being extracted by this method.



B. Underground mining:

1. Adit mining: It is used to extract minerals deeper to side of the hill. A horizontal tunnel is built to reach and extract minerals. Coal from the Sor coalfields near Quetta is extracted by Adit mining.
2. Shaft mining: It is used to extract minerals lying deeper to land surface. A vertical tunnel is dug to reach the mineral. This may involve use of explosives and giant excavators. This is the most dangerous and expensive method of mining as there are chances of toxic gases to escape, suffocation to occur, collapsing of mine roof and also flooding by eruption of water pockets.



3. (AI) (D) Study Fig 3.1 a diagram showing a method of coal extraction.

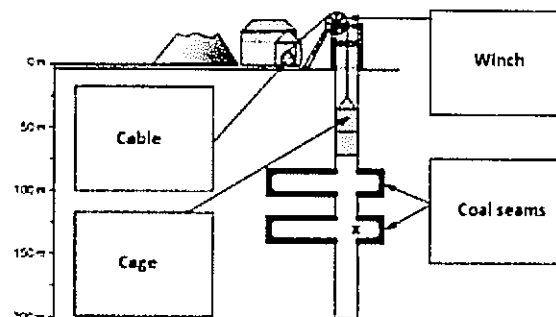


Fig. 3.1

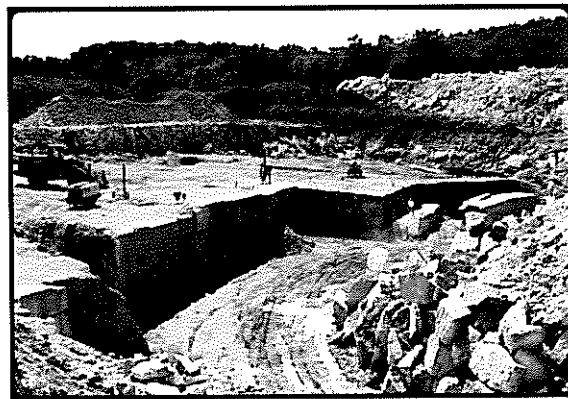
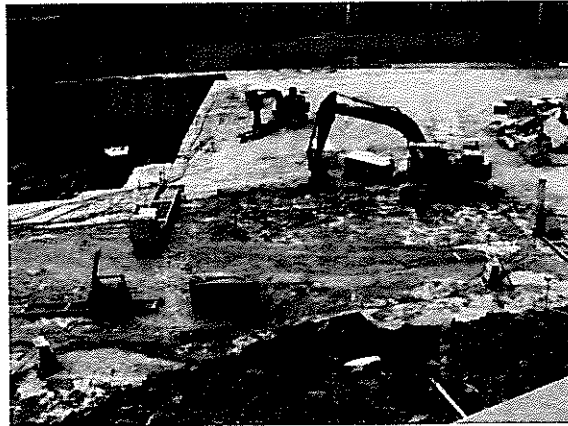
Complete the boxes on Fig. 3.1 by choosing the correct words from the list below.

cable	cage	coal seams	fixed frame
lunnel	winch	wheel	

(4)

C. QUARRYING OF LIMESTONE

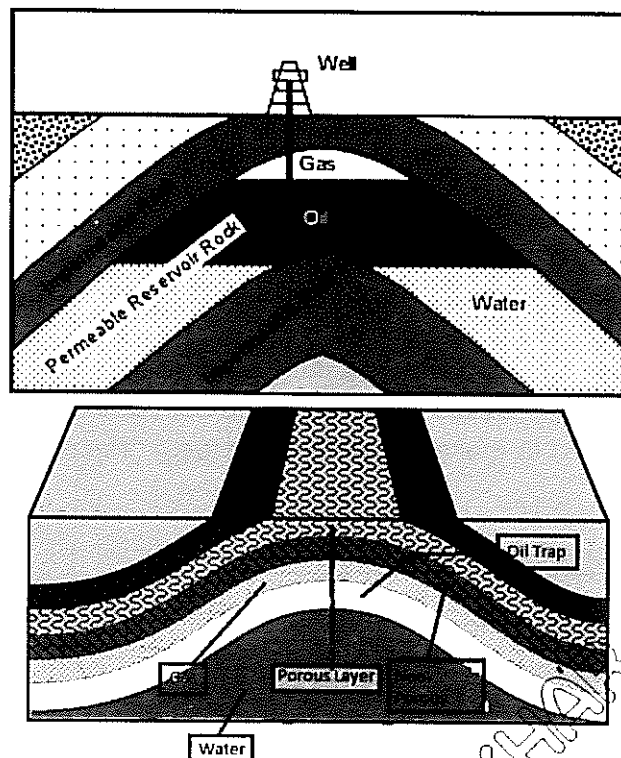
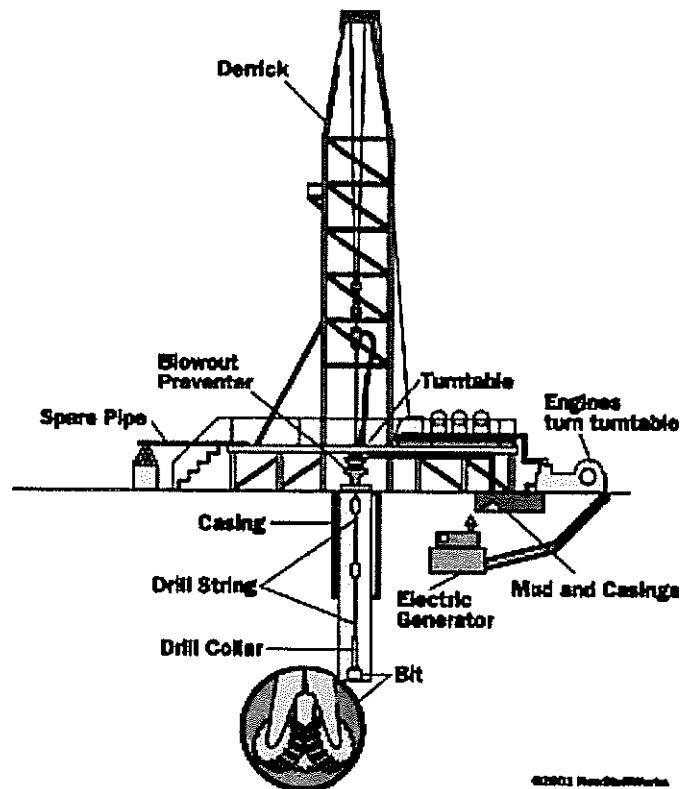
- Limestone ridges outcrop on the land surface, e.g., questas in Sindh.
- It is extracted by open excavation.
- Simple manual method using hand tools, e.g., hammer, wedge, chisel, drill, power saw and explosives.
- Huge lumps of limestone are cut into smaller pieces according to the purpose of their use: engineering, cement making etc.



D. OIL DRILLING (PART OF THE CHAPTER OF POWER RESOURCES)

- Oil is located at greater depths.
- The site is located after a thorough survey using modern techniques such as satellite imaging.
- A huge steel structure comprising an oil derrick and rig, is set up at the drilling site.
- Several drilling pipes and digging apparatus are attached to the oil derrick.
- Deep digging is done to reach the sedimentary rocks called anticlines.
- Anticline is a dome shaped rock with porous and non-porous layers.
- A diamond-tipped instrument is used to cut through the various layers of the anticline.
- Oil lies between a layer of gas above and a layer of water below: "oil trap".
- Oil is pumped out through the derrick pipes and supplied to the nearby oil refinery, e.g., the Attock Refinery Limited near Rawalpindi in the Potwar Oil Field.
- Finally the derrick is removed.

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METALLIC MINERALS:

1. **Copper:** It is found in Saindak in south west Balochistan. **Uses:** it is used to make electric wires, switches, sockets, water supply pipes and tanks, also used to make alloys e.g. brass (mixture of copper and zinc) and minting coins.
2. **Iron ore:** It is found in upper and lower KPK, Upper Punjab (Salt Range) and Southwestern Balochistan. **Uses:** it is used in the making of steel, tools, instruments,

heavy and light machines and also in a variety of equipment. Pakistan imports iron ore from China and South Korea for the PSM (Pakistan Steel Mill).

3. **Chromite:** It is found in Muslim Bagh, Chagai hills and in South West Balochistan. **Uses:** it is used to make steel, engineering tools, railway bridges and carriages as well as in lining of furnaces.
4. **Bauxite/Ore of Aluminium:** No huge deposits in Pakistan; imported from the EU (European Union) states. Bauxite is purified to obtain aluminium. It is a valuable metal. **Uses:** construction industry for making staircases, railings and window panels; also used for making cans, tins and utensils; for making aircrafts by the advanced countries.

NON-METALLIC MINERALS:

1. **Rock salt:** It is found in the Khewra mines at the Salt Range in Upper Punjab. **Uses:** It is used for cooking, preserving food items like fish and making various sodas e.g. soda bicarbonate and soda carbonate that are used by textile industry for bleaching and tanning; also supplied to the pharmaceutical industry to make saline solutions. Saturated salt in liquid form is called Brine that is used in the chemical and fertilizer industry.

Limestone: It is usually found near the gypsum deposits: Upper Punjab and the adjoining areas of KPK, Lower Punjab, many parts of Sindh, e.g., in the cuestas of upper and lower Sindh, and in some places of Balochistan. **Uses:** Main raw material for cement; also for making paper, paints, glass, soaps; used for reducing the acidity of soil and to treat sugarcane waste to obtain alcohol fuel. It is painted on trees as an anti-termite agent.

2. **Gypsum:** There are widespread deposits in Potwar region and KPK. **Uses:** It is added to cement to keep it in powdered form; also used for making chemical fertilizers, paints, pre-fabricated construction material and POP (Plaster of Paris); sprinkled on the salinity affected soils.
3. **Marble:** There are vast deposits in almost all provinces e.g. Potwar region, parts of KPK and Lower Sindh. **Uses:** It is used in the construction industry for flooring, tiles and chips; also used to make decorative items e.g. chess boards, penholders and paper-weight.

BENEFITS / ADVANTAGES OF MINING INDUSTRY

- Source of employment
- Local development
- Raw material for industries; cutting down import spendings
- Chances of export earning
- Utilizing local talent
- Chances of conducting research on modern mining methods

EFFECTS OF MINING ON THE ENVIRONMENT:

1. Damage to natural landscape:

- Causes depressions on land surface due to the use of heavy machinery and explosives.
- Also causes deforestation as land is to be cleared for mining.
- Depressions on land make flood more destructive.

2. Variety of pollutions:

- Air pollution by dust, smoke and emission of gases.
- Land/ surface pollution by untreated mineral waste.
- Water pollution as the untreated waste seeps through land to the water channels.
- Noise pollution by heavy machinery.

3. Serious health hazards to the miners:

- If proper safety devices are not provided to the miners they remain vulnerable to various diseases due to poor ventilation and air pollution.
- They often get respiratory diseases like TB (Tuberculosis), Bronchitis and Asthma.
- They may fall victim to various accidents such as, collapse of the mine, sudden eruption of the hidden water pockets, suffocation and release of toxic gases from the mine.

MEASURES TO MINIMIZE THE ADVERSE EFFECTS OF MINING:

- Mining to be done in scientifically designed ways.
- Reafforestation of the deforested areas.
- Filling of depressions on surface.
- Proper and effective treatment and disposal of mineral waste.
- Installing water filtration plants at the sites of mining.
- Providing safety devices to miners e.g. clothing, masks etc.
- Providing education and training to the miners, while providing health, education and recreation facilities for their families.
- Following a strategy of sustainable development and mining: it means that mining should be done in such a way that the upcoming generations also exploit the mineral reserves while there is minimum damage to the environment.
- Installing precipitators and catalytic converters at the site of mining. A precipitator is a device for removing dust particles from a gas. Similarly, a catalytic converter is a device that controls the emission of toxic gases and converts them to less toxic variants.

Sample Questions

Q.1 To what extent can Pakistan increase mineral extraction and exploitation? [6]

Ans.

Pakistan has huge deposits of many non-metallic and some of metallic minerals. Rock salt, limestone and gypsum are exploited on large scale. By making cement with limestone and gypsum Pakistan can export it to improve its BOP (Balance of Payment). There are abundant reserves of copper, silver and gold in Balochistan that Pakistan can extract and exploit with the help of local and foreign investors, e.g., China and Iran. The PMDC (Pakistan Mineral Development Corporation) can provide incentives to the mining engineers and workers to maximize extraction. However, lack of interest by various governments, mismanagement of funds and a deteriorating security situation in Balochistan, Sindh and Tribal Areas restrict any large scale projects. Pakistan has poor quality iron ore deposits as a result of which it spends heavily on importing iron, manganese and coke to feed its iron and steel industry. Heavy investment is needed to extract minerals from rugged areas. Pakistan has full potential to develop mining industry by attracting more foreign investors. It should adopt modern mining strategies and devices, and conduct a research for exploitation of its mineral wealth.

Q: 2

Statement A:

Pakistan should locate new sites to extract metallic minerals like iron ore, aluminium and manganese as these are precious metals.

Statement B:

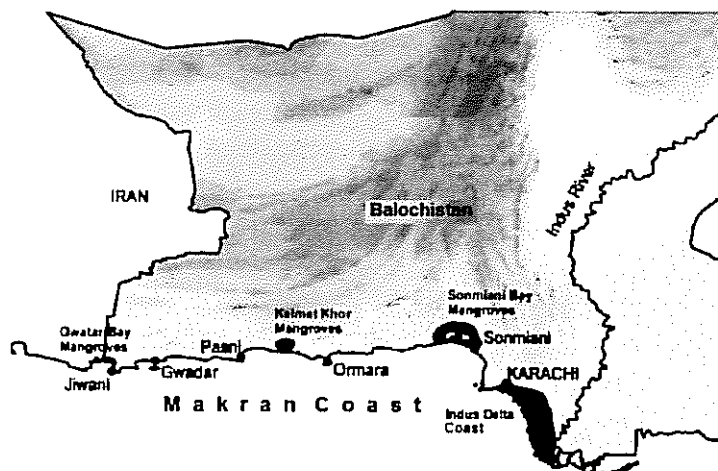
Pakistan should continue to import high value minerals to feed its large scale and heavy engineering industries.

Which statement do you agree with more? Explain by referring to examples in Pakistan. (6)

Ans. Pakistan is importing iron ore, manganese and coke from China, the EU countries and Australia for its iron and steel industries. These imports are adversely affecting Pakistan's BOP (Balance of Payment) as Pakistan is already a heavily indebted country. Moreover, international political disturbances may affect these imports that will damage Pakistan's struggling economy. Therefore, it will be wiser to locate and extract Pakistan's own mineral deposits. Therefore, Pakistan should develop projects like Sandak Copper Project in Balochistan. China is already investing in such projects. Recently discovered gold deposits in Reko Diq, if extracted with a strong political will, may significantly improve Pakistan's economy. Pakistan can develop infrastructure in Balochistan to set up some large scale industries and thus reduce the inter-provincial disparity by developing this province. Thus not only the import cost of Pakistan will be reduced but also the problems of unemployment and terrorism will be solved.

CHAPTER 06

FISHING INDUSTRY



Marine Fisheries:

- Located on the Makran Coast (70% of the total coast) and the Indus delta/Sindh/Karachi Coast (30% of the total coast).
- Main types of Marine Fish: Sharks, Drums, Croakers, Cat fish; also Prawns and Shrimps.

Inland/Fresh Water Fisheries:

- Widely spread in rivers, ponds, lakes (Dhanda in Sindh) and reservoirs in several parts of Pakistan.
- Main types of Inland fish: Rahu, Trout, Palla, Manaseer/Mahashir, Chinese varieties, e.g., Grass and Silver.

Fish Farming/Aquaculture:

- Human arrangement of keeping and rearing fish in the artificially made fish farms, usually in the agricultural land.
- Artificially developed inland fishing.
- Mainly the popular inland fish varieties are bred.

Types of Fishing Based on the Purpose of Catching Fish:

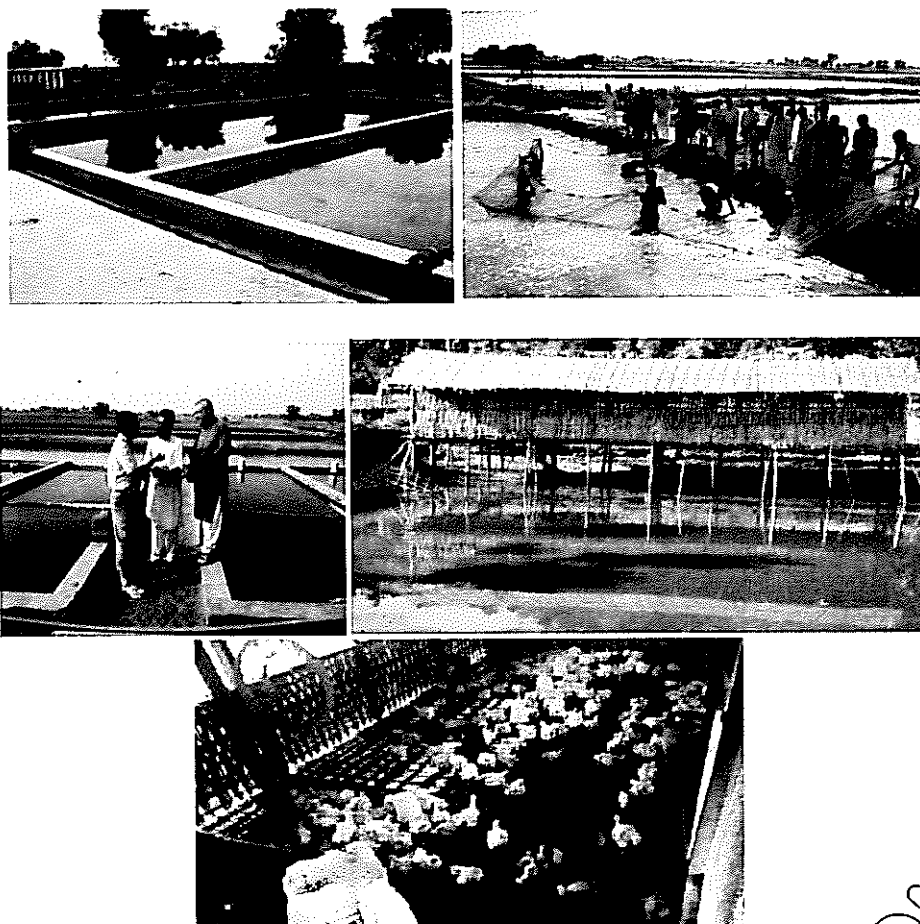
Subsistence fishing:

- When fish is caught to be consumed by the poor fisherman and his family.
- Several poor fishing communities near the coastal areas practice this.
- Any accidental big catch comes as a bonus, not expectation.
- Traditional fishing methods are used: traditional boats that are rowed by manual oars and so, they can hardly travel upto 5 km in the sea and cannot afford overnight stay; traditional nets that rely on "hit and trial method"; smaller catch; no modern equipment on the ship, e.g., transmitters etc.

Commercial Fishing:

- Fish is caught to be sold/exported.
- Usually modern devices and methods are used: mechanized boats/big trawlers that can travel upto 50 km, and so, the fishermen can spend some days in the sea; modern gill nets with small metal hooks are used to ensure a bigger catch; transmitters to receive radio signals about the weather are used; ice bags and other arrangements for storing fish on the trawlers.

Details of Fish Farming:



- Usually rectangular-shaped man-made ponds (farms) for breeding fish.
- Cemented impervious base to prevent water loss through leakage/seepage.
- Solid mud to line banks of the farm.
- Trees on sides to: provide oxygen, keep water cool and minimize water loss through evaporation; growth and fertilization of fish is facilitated.
- Types of fish bred in fish farms: most of the inland types e.g. Rahu, Trout, Thalla; also the Chinese varieties; Silver and Grass.
- Usually, a fish farm divided into two parts; a nursery and another pond for adult fish.
- Recently, a new trend of establishing a poultry / livestock farm in the neighbourhood of a fish farm: a good means of natural recycling.

Processes on a fish farm:

1. Feeding the fish.
2. Breeding and cross-breeding.
3. Giving growth hormones for rapid growth.
4. Sorting out fish according to the size and type before selling.
5. More productive activity if combined with poultry farming/livestock farming because of a number of advantages that include:
 - Better yield of fish due to active nutrients coming from the poultry/livestock waste (manure).
 - Poultry droppings provide fertilizers for fish ponds in the form of highly soluble salts to promote growth of vegetation at the base of the farm e.g. plankton.
 - Cattle, poultry, ducks should be raised on the pond embankments.
 - Fish waste serves as poultry feed.

Importance/Advantages of fish farming:

- Means of self-employment.
- Greater returns to the fish farmer.
- Additional source of earning foreign exchange.
- Reduces burden on crop and livestock farming.
- Productive use of available land.
- Increased fish production can be ensured by modern technology and enhanced skills.
- Effective means of recycling animal waste, if combined with poultry farming: fish and poultry waste.
- Combining the two becomes more economical for the owner.

Disadvantages of Fish Farming on Environment

- Undesirable /adverse effects on the ecosystem: Lowered water table in the neighbouring areas as sub-soil water is pumped out for the farm, leading to appearance of salts on the land due to evaporation of water; soil no more fit for vegetation or crop farming.
- Conversion of coastal wetlands into fish farms has disturbed the growth of fish varieties and other animals living in the marshy areas.
- Chemical pollution: Effluents from fish farm contain various chemicals e.g. disinfectants, pesticides that are used against pests, insects and predators, also the use of hormones for rapid growth has adverse effects.

Government's Efforts to Promote Fisheries:

- New fishing methods e.g. mechanized boats
- Developing value-added products e.g. canned / frozen and gutted fish (removal of intestines and other undesirable parts) by providing advanced processing facilities.
- Improved weather information system by radio, transmitter and improved services of the meteorological department.
- Start of research and development projects by the MFD (Marine Fisheries Department) e.g. 'Monitoring of Deep Sea Fishing Vessels', 'Strengthening of Quality Control Laboratories' and improvement in the MFD labs in line with the WTO requirements.
- More recently a variety of development projects at the Gwadar port; deep sea fishing and introducing latest fishing techniques.
- Efforts to improve fish marketing: both at domestic and international levels.

- 1992, start of work on the Gwadar Fish Harbour cum Mini Port to provide facilities for processing e.g., ice factories and cold storage.
- Another harbour at Pasni.
- Connecting Gwadar with China and the CAR's (Central Asian Republics) through a long motorway as part of the CPEC (China Pak Economic Corridor).
- Proposal of building small dams on the Makran coast.

Feasibility of developing fish industry in Gwadar

Helping Factors/Advantages:

- About 50% of Gwadar's population involved in fishing
- Possibility of providing simple fishing techniques and a variety of instruments e.g, nets, nylon ropes, floats and winches (device to catch fish), small boats and nets.
- Loans may be given to the poor fishermen to buy big boats, gill nets and modern processing devices.
- Main species: mackerel, Herring, Sardines, Octopus, Catfish etc
- Subsistent farmers don't catch fish from May to September as it is the breeding season.
- Gwadar is part of the 70% of the total coast of Pakistan, and there is huge potential to develop and exploit a large coastal area.
- Gwadar provides 25% of total marine catch in Pakistan.
- 1970 only one ice factory at Pasni, now 6 ice factories in Gwadar.
- Lesser geographical distance from Gwadar to the Middle Eastern States as compared to a longer distance from Karachi.
- Keen interest shown by China, and the recent start of the CPEC (China Pakistan Economic Corridor), started in 2016.
- Good potential for building some canning industries in Gwadar; speedy work already in progress on developing a good network of roads, e.g., Makran Coastal Highway built in the early 2000's.

Limiting Factors/Disadvantages:

- Very low population density; lesser availability of the skilled workforce.
- Huge investment required for: developing infrastructure, setting up training institutes for modern fishing techniques, providing deep sea fishing apparatus due to a deep continental shelf on the Makran coast.
- A worsening law and order situation, insecurity and terrorism in several parts of Balochistan.
- Lack of trust between Balochistan and the Central Government of Pakistan; most of the tribal chiefs have grievances regarding the way the affairs of Balochistan are handled by the Centre.
- A huge number of Afghan refugees and involvement of foreign secret agencies, sectarian violence have all halted any development project.
- A very low literacy rate and poor economic activity in Gwadar and neighbouring areas.

Problems of Fishing Industry:

(1) Water pollution:

- Mainly Karachi area by oil spill from the oil tankers.
- Careless disposal of untreated domestic and industrial waste that eventually causes water pollution.
- Release of a variety of chemicals into water channels; some of these have many toxic materials like carcinogens (those that can cause cancers), heavy metals e.g., cadmium, nickel and aluminium; many of these have been detected in fish and shrimps.
- Inland fisheries are also polluted due to untreated waste by a growing population as well as a rapid pace of industrialization and urbanization; more wastes is dumped into fresh water channels: rivers, lakes and ponds.
- Leaching of chemical fertilizers and pesticides into river from factories and farms.

(2) Overfishing:

- Fishing throughout the year, including the breeding season May to September; production and growth of fish and shrimps is restricted.
- Use of illegal devices to get a bigger catch in many remote areas.
- Another main reason is the trespassing by foreign trawlers, mainly Indian.

(3) Threat to mangroves:

- Mangroves act as natural habitat, breeding ground and shelter for the fish and shrimps; their falling leaves provide nutrition for fish and shrimps.
- Depletion of mangroves due to reckless cutting by the local community and water pollution; also, a reduced flow of fresh water to the Indus Delta as a result of construction of reservoirs upstream of the Indus.

Sustainability of Fisheries:

- Developing fisheries in such a way that their production continues for the present generations while ensuring their availability in sufficient amounts for the future generations.
- This can be done by banning/minimizing the following:
 1. Over-fishing and catching baby fish.
 2. Using illegal devices (nets etc.) for a bigger catch.
 3. Unplanned cutting of mangroves.
 4. Water pollution by untreated domestic and industrial waste.
- Government should restrict the foreign deep-sea trawlers in the Pakistani territory.
- Laws should be implemented for maintaining the ecological balance while developing fish farms specially in the coastal wetlands.
- Modern breeding and cross-breeding techniques should be adopted to get healthier strains of fish.

Sample Questions:

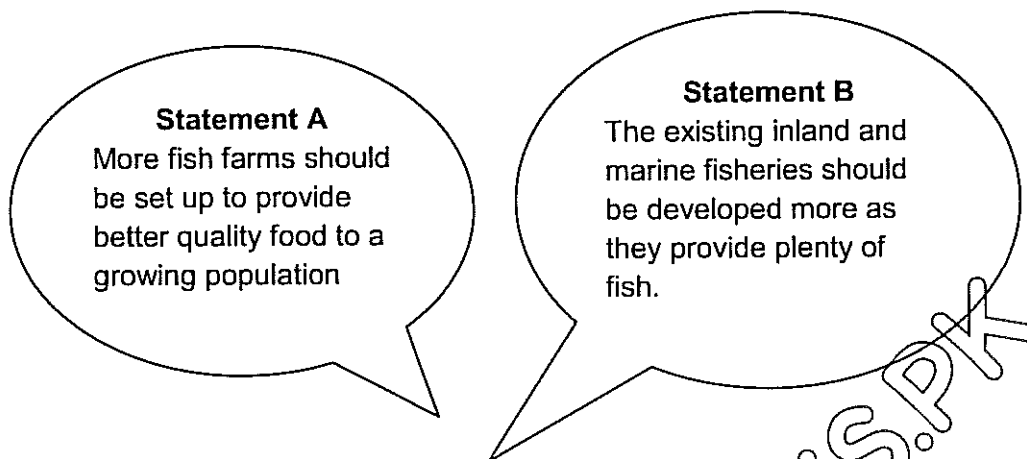
Q. To what extent can Pakistan ensure the sustainability of various types of fisheries? [6]

Note: Refer to both successes/helping factors and failures/hindering factors.

Ans.

Several fish farms can be set up by giving loans and technical training to the poor fishermen in all the provinces. Research experts can be encouraged to find ways of making the fish farming an eco-friendly activity. Use of chemicals/disinfectants may be minimized on fish farms. Efforts can be made to introduce modern deep-sea fishing on the Makran Coast. Local and foreign investors like China may be attracted to invest in the development of marine fisheries on the Makran Coast. Laws should be strictly enforced to minimize water pollution by introducing recycling techniques for the disposal of waste. However, enforcement of laws is difficult in Pakistan. Tribal opposition and a deteriorating law and order situation in Balochistan create many bottlenecks in accomplishing any development project. Lack of funds and reluctance of foreign investors to invest in a troubled country also hinder the efforts for developing fisheries on the Makran Coast. Pakistan can ensure sustainability of fishing industry by conducting research on modern fishing techniques and cross breeding methods.

Q.1: Read the two statements and start your answer by supporting either of the statements; give some disadvantages of the statement; then explain the other statement with a greater number of advantages; produce a brief judgement at the end.



Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

The marine and inland fisheries do not require huge investment and the government may take measures to reduce water pollution and train fishermen to maximize the catch. The Makran Coast can be developed with the help of Chinese investment in order to increase the fish catch. Deep sea fishing techniques will guarantee a bigger catch, and therefore, an increase in the export of fish. Geographical distance between Gwadar and the Middle Eastern States such as the UAE and neighbouring countries is much shorter than that from the Indus Delta Coast. This will reduce the transportation time and cost. On the other hand,

setting up fish farms is more costly and requires more land. Due to increased urbanization and development projects, the availability of land for fish farms has already decreased. Also, the fish catch from a fish farm is much smaller than that from the natural fisheries. Fish farms constantly need fresh water supply, and this causes a lowered water table in the neighbouring areas. Therefore, developing inland and marine fisheries will provide plenty of jobs to the local people and increase Pakistan's exports earnings.

Past Paper Question:

Fishing is an important and growing economic activity in Pakistan. Read the following two views about ways to develop the fishing industry in Pakistan sustainably:

A

Developing inland fish farming has greater benefits for the people and economy and is more sustainable.

B

Developing marine fishing has greater benefits for the people and economy and is more sustainable.

Q: Which view do you agree with more? Give reasons to support your answer and refer to examples you have studied. You should consider View A and View B in your answer. [6]

Ans.

There are several sites for developing inland fisheries that provide jobs to many people living near them. However, more land is needed to grow food and cash crops. Most of the fish is caught and sold during winters only thus limiting the income for the fishermen. Therefore, it will be wiser to develop marine fishing industry especially along the Makran coast that constitutes about 70% of the total coastline. People living on the Makran coast have inherited skills to catch the fish, and they only need technical and financial assistance. China has already invested on a large scale in the development of Gwadar where ice factories and cold storage arrangements have already been set up. Makran Coastal Highway has reduced distance between Gwadar and Karachi. With the completion of CPEC (China Pakistan Economic Corridor) fish caught from Makran coast will be transported quickly in huge amount to China, and possibly to the Central Asian countries, thus diversifying Pakistan's trade partners.

CHAPTER 07

AGRICULTURAL DEVELOPMENT

Types of Agriculture: 1. Crop Farming/'Arable' Farming 2. Livestock Farming 3. Fruit Farming

Both crop farming and livestock farming operate as a system and are practiced on subsistence and commercial/cash crop scale.

1: Crop Farming, has two types:

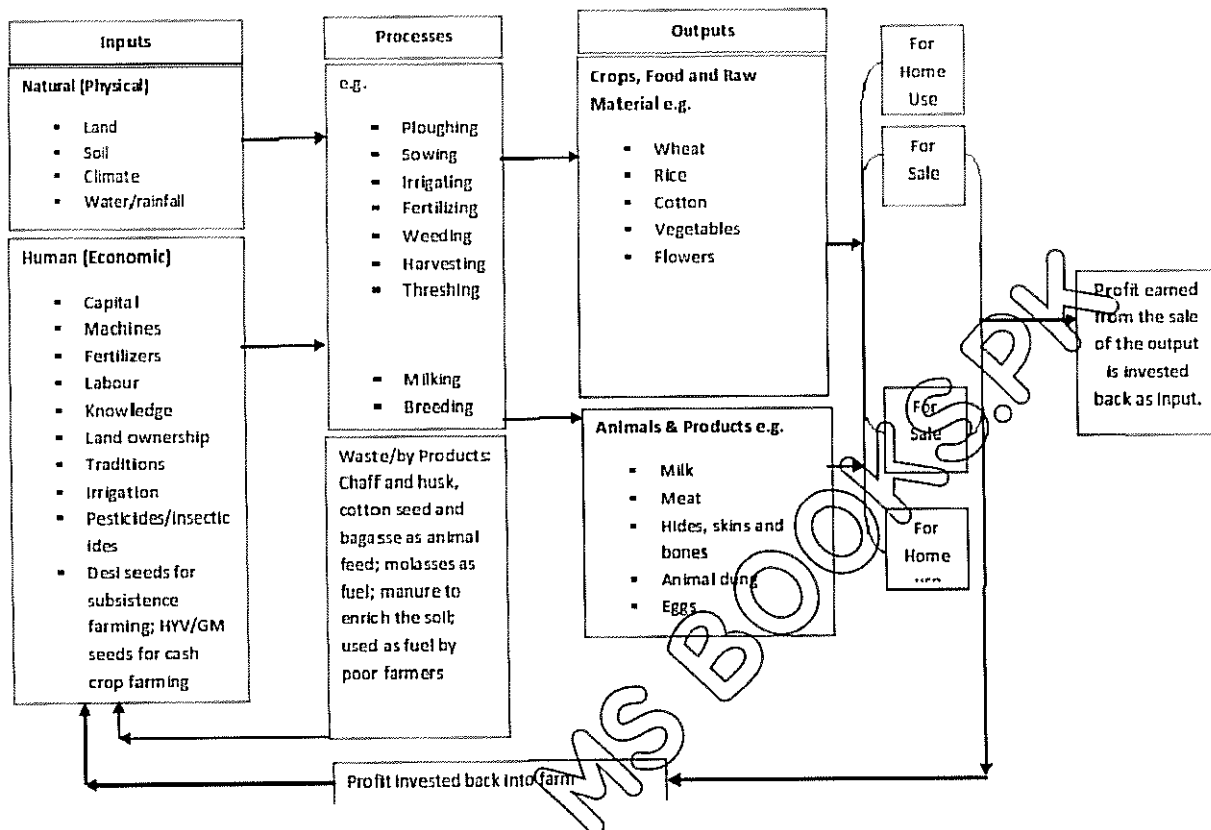
a. Subsistence Farming:

Crops grown to satisfy needs of farmers. Traditional methods are used to grow crops: wooden plough that is driven by draught power (bulls, oxen), Persian wheel for irrigation or dependence on rainfall in case of Barani farming (rain fed crop farming) and natural manure/animal dung.

b. Cash crop/Commercial Farming:

- Crops are grown with the purpose of selling the yield and earning profits.
- Modern methods and human inputs are used e.g. modern irrigation methods (tube wells and perennial canals), chemical fertilizers, machinery, pesticides and insecticides, and HYV (High Yield Variety)/GM (Genetically Modified) seeds.

Crop and Livestock Farming as a System



Types of crops:

1. Rabi crops: Sown in early winter, in October/November; harvested in early summer in April/May. Examples include: wheat, grams, barely.
2. Kharif crops: Sown early summer (April/May) and harvested early winter (October/November). Examples include rice, cotton, sugarcane, pulses, millets, maize and tobacco etc.

Major Crops of Pakistan:

1. Wheat:



Wheat Growing Regions: Several parts of the Upper and Lower Indus Plains (Punjab and Sindh); valley areas of KPK, e.g., Bannu, Swat and Peshawar; also Nasirabad and Jaffarabad districts of Balochistan.

Geographical Requirements: Wheat requires stiff loamy soil, mild temperature from 15 to 25 degree Celsius and moderate rain that comes from the Western depressions; however, irrigation is always needed; a little shower shortly before the harvesting swells the grain and improves the yield.

Human Inputs: HYV/GM seed, e.g., Maxipak; tractors with harvesting and threshing machines; chemical fertilizers and pesticides/insecticides.

Process of wheat cultivation:

- Sowing on the ploughed field.
- 1st irrigation spell a month after sowing, and the 2nd spell one month before harvest, mild rain before harvest improves yield.
- Harvesting and threshing (separating grain from chaff) is done both manually and by machines/combine harvester.

Barani Method of Wheat Farming:

- Sowing in early winter: October-December.
- Crop grows with the increasing rainfall, 15-40 mm from Western depressions.
- Mild temperatures suitable for growth: 4-19 degree Celsius.
- Grain begins to swell with a higher rainfall, 80-100 mm in March-April.
- Ripening of crop with gradually rising temperature, 12-25 degree Celsius.
- Harvesting in spring/early summer: April-May.
- Farmers make arrangements for storage of rainwater.

Uses of the Output:

- Wheat grain is stored by the farmer for his family and supplied to the market for domestic and industrial consumers.
- Wheat flour is used to make Chapati/Roti, bread, buns and other bakery products.
- Wheat is the top staple food for most Pakistanis.
- Chaff is used as fodder for livestock, for building mud-houses and wheat stores; also used for making paper and chip-boards.

2. Rice:





Areas of Cultivation: North-eastern districts of Punjab: Sialkot, Shekhupura, and Gujranwala; in Sindh, districts of Larkana and Dadu mainly; on small scale in Peshawar and other valley areas of KPK.

Geographical Requirements and Human Inputs:

- Requires loamy soil with an impervious (non-porous) sub-soil to retain water.
- Suitable temperature is 20-30 degree Celsius.
- Heavy rain up to 2000mm; irrigation is always needed in Pakistan.
- Human inputs include tractor with harvester and thresher, canal irrigation, GM seeds, e.g., Colonel Basmati, Irri 86; insecticides/pesticides and fertilizers etc.

Processes of Cultivation:

- 1st stage: seeds are sown in nurseries till they reach the height of 9 inches/22-23cm.
- 2nd stage: the nurseries are transplanted to the already irrigated fields that are flooded to a depth of 30-37cm.
- Here the remaining cultivation period is completed.
- Just before harvest the water is drained off.
- Harvesting is done both manually and by machine.
- Grain is separated from husk by threshing.

Uses of the Output:

- Rice grain supplied to the rice mill for polishing and packing.
- Polished grain supplied to the domestic consumers and markets.
- Rice is second popular staple diet in Pakistan.
- Husk is used as fodder by livestock and making mud roofs, also supplied to factories for making cardboards.

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3. Sugarcane:



Areas of Cultivation: Several parts of Punjab including districts of Kasur, Okara, Faisalabad and Rahimyar Khan; districts of Sindh including Nawabshah, Nausharo Firoz and Hyderabad; also, Peshawar and Mardan in KPK.

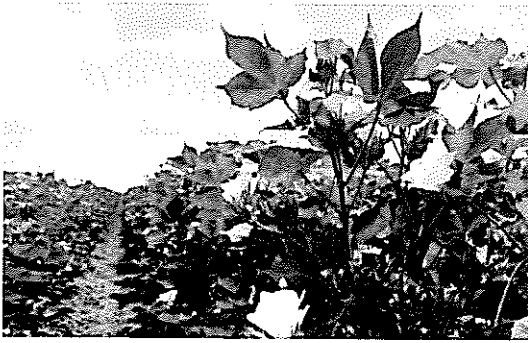
Natural and Human Inputs:

- Medium loamy and clayey soil; constant addition of natural manure and potash-rich fertilizers to the soil to maintain its fertility (as sugarcane is a bulky crop and rapidly exhausts the soil nutrients); 25-35 degree Celsius temperature; heavy rain, about 1520mm is required; due to insufficient rainfall irrigation is needed; tractor with harvester and thresher, GM seeds and chemical sprays for a better yield.

Process of Cultivation:

- Ploughing; 30 cm tall cane stalks planted with a distance of 30 cm between two stalks, in April-May.
- Several irrigation spells, about 20-25.
- Enriching soils with natural manure and potash-rich fertilizers.
- Use of sprays to kill pests and insects.
- When cane is 6-7 feet tall, ratooning is done: cutting the cane in such a way that some part of the cane stalk is left in the ground.
- Ratoons can be used for the next 2-3 crops.
- The dirt and smell is removed by chalk.
- Bundles of stalks are loaded on a vehicle and are transported quickly to the nearby sugar mill because it is a bulky crop and starts losing weight after harvest and this badly affects quantity and quality of sugar.

4. Cotton Crop:



- Kharif/Summer Crop.

Areas of cultivation:

- Central and Southern Punjab: Faisalabad, Khanewal, Bahawalpur, Bahawalnagar, Multan; Sindh: Sanghar, Nawabshah; Balochistan: Lasbela, a recently discovered new area for cotton cultivation.

Natural Inputs:

- Medium loamy soil; manure and chemical fertilizers to maintain soil fertility.

Temperature:

- 25 – 35 degree Celsius; sensitive to frost

Rainfall:

- Plenty of rain, 1000 mm, in frequent showers, with sunny intervals; Irrigation is needed due to insufficient rainfall.

Human Inputs:

- Tractor for ploughing and harvesting (combined harvesters are attached to tractors); automatic cotton picking machine to save time, but uncommon in Pakistan due to the availability of cheap, efficient and obedient labour, usually women of tenant farmers; chemical fertilizers to enhance soil fertility; chemical sprays of pesticides, insecticides (to prevent virus, pests, locust); HYV/GM (Genetically modified) seeds, e.g., Nayab-78, B-557 and 149-F

Process of Cultivation:

- Seeds sown at 30 -45 cm distances in Apr – May.
- First irrigation spell after one month; 2nd irrigation spell after another 2 months.
- Crop ripens in dry months of Oct-Nov, to reach 135-150 cm height.
- Size of the cotton boll depends on the variety of the seed and use of fertilizers.
- Chemical sprays when crop is mature.
- After picking, bolls transported to ginning mill where seeds are separated from lint (white fluffy mass)
- Seeds used for; the next crop, extraction of oil and animal feed.
- Lint is sent in the form of cotton bales to the yarn mill for making cotton yarn.

Uses of Output:

- Cotton yarn is made by spinning the lint fibers.
- By the process of weaving cotton cloth is made in the cotton textile mill.
- Cotton cloth/fabric is used for making cotton cloth, bed linen and readymade garments.

Other Crops:

1. Tobacco:

Kharif crop mainly cultivated in KPK as well as in some parts of northern Punjab; an important cash crop as it is a raw material for cigarettes manufacturing.

2. Millets and Maize:

Millets/Jowar and Bajra: can be grown on a variety of soils, even on poor soils; cultivated in many parts of Punjab e.g. Potwar plateau region; many parts of KPK and Sindh; serve mainly as fodder for livestock and poultry; also provide an inferior grain for poor, subsistence farmers.

Mazie: Kharif crop; grown mainly in KPK and some parts of central and upper Punjab; used for making corn-flour, custard powder and other products of food industry; food grains for poor farmers and raw material for edible oil production.

3. Pulses and Grams:

Cultivated in many parts of Punjab and Sindh; also in a few districts of KPK (Bannu and D.I.Khan); pulses enhance soil fertility by fixing nitrogen; source of plant protein and so popular diet for the poor; famous varieties are Mung, Mash, Masoor and Grams/Chana.

4. Oilseeds:

Can be grown in a variety of soils including the desert soils; extensively grown in northern and southern Punjab and many parts of Sindh; only 32% production meets the local needs, 68% is imported.

Famous varieties like sunflower, soya bean, mustard, sesame etc. are used to extract edible oil; linseed and castor seeds have industrial uses.

2: LIVESTOCK FARMING:

SUBSISTENCE TYPE

1: NOMADIC:



- Practised by the nomadic people in Balochistan and the desert areas of Punjab and Sindh.
- They move from place to place along with their animals in search of food and water.
- Normally they rear sheep, goats and camels.
- Sheep and goats provide them milk and meat; camels used as means of transport; camel hide is used for making tents.
- On finding any grazing ground or water source,, they settle down for several weeks to get food, water and fodder.

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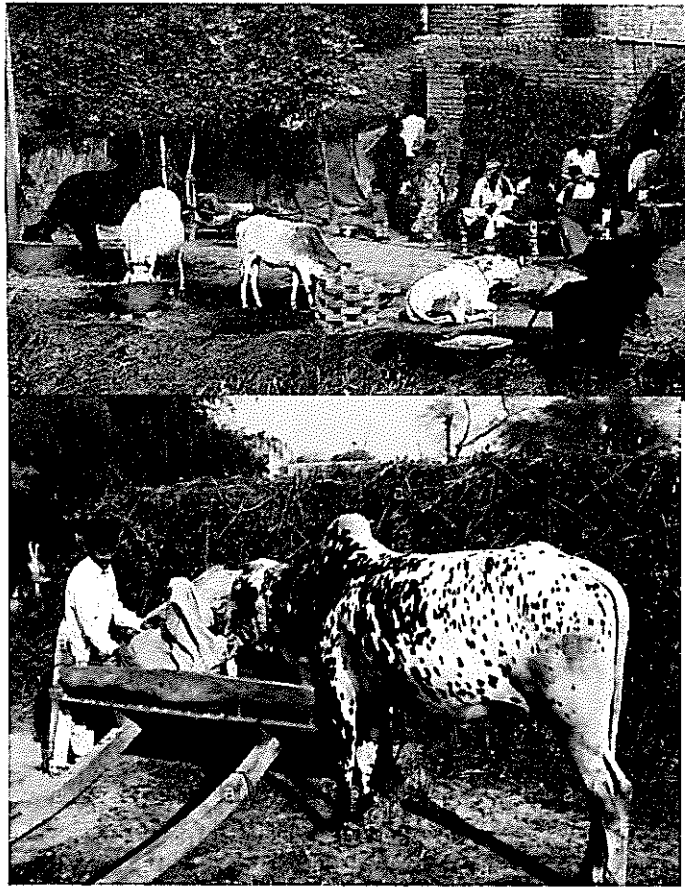
1. TRANSUMANCE:



- A kind of seasonal migration.
- Herdsmen in the northern mountains move to less cooler places along with their livestock: cattle, yak and dzu; the animals are kept on pastures high up in the mountains in summers and brought down to lower levels in winters; the animals are often kept in sheds.
- Also practiced in some parts of the Western Mountains; goats, sheep and cattle are the main animals.
- Meat, dairy products, skin and wool are the main outputs.

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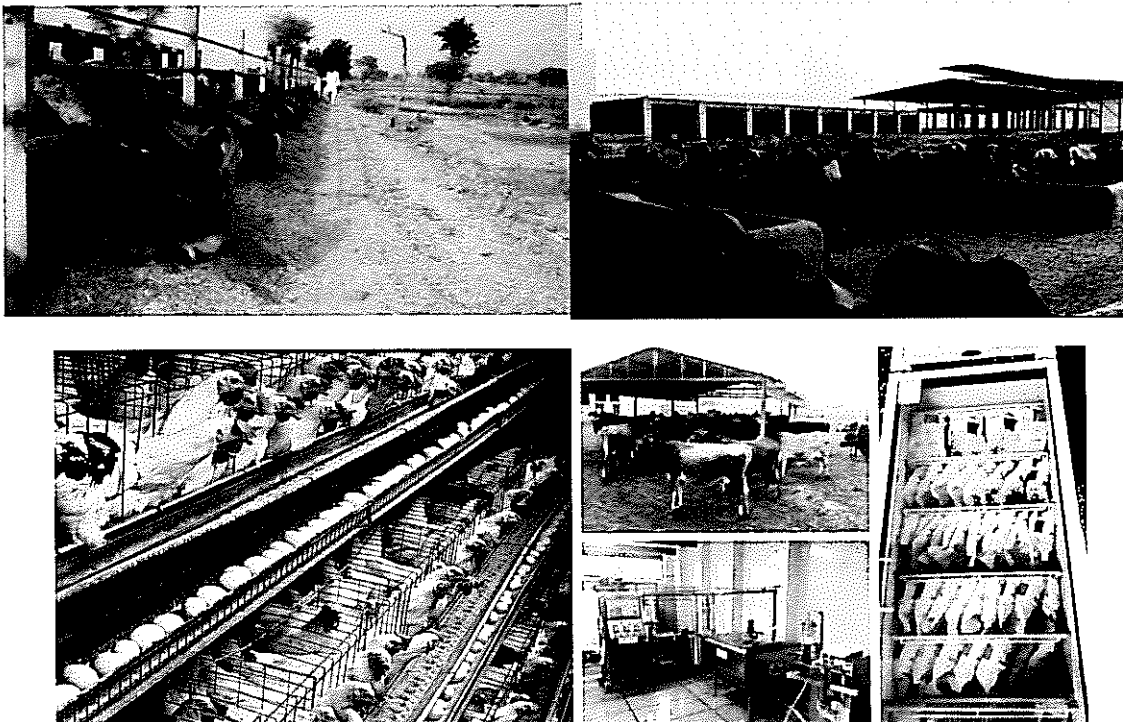
3: SETTLED:



- Practiced in the villages of Punjab and Sindh mainly.
- Cows, buffaloes and hens are kept for milk and eggs to be consumed by the family.
- Excess milk is processed to make butter or ghee, cheese and yogurt which are important components of their diet.
- The inputs used are mainly derived from nature and the processes followed are the traditional ones.
- The outputs are minimal.
- Occasionally, the wool or meat is sold to buy more animals and other necessities of life.

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LIVESTOCK FARMING ON A COMMERCIAL FARM:



- Practiced either on a small scale by private owners or on a large scale by the government owned or military farms.
- Since the 1990's involvement of major and multinational investors like Nestle has boosted this farming.
- Bulk of the livestock products are still supplied by small-scale private owners, though they do not use all the scientific methods.
- Urban supplies of milk still come mainly from buffalo herds in the cities themselves.
- Commercial dairy farms are set up on vacant plots but often lack appropriate drainage or water supplies, making them incompatible with modern hygienic city life.
- Fodder usually brought from the nearest crop growing area, often by heavily overloaded lorries.
- Cattle dung is collected and dried in circular cakes plastered on any convenient wall and sold to the market to be used as manure or domestic fuel.
- There are Australian designed dairy farms for Islamabad and Karachi, the Government Dairy Farm for Quetta and many other military farms in other cities.
- To boost livestock production scientific breeding methods, such as cross-breeding to increase fertility rates, and better nutritional diets are in use on many of such farms.
- Early weaning diets have also been introduced for rearing buffalo and cow calves to save milk for human consumption.
- To improve veterinary facilities, specially hired staff is trained and new methods are used on selected farms.

IMPORTANCE/ADVANTAGES OF LIVESTOCK FARMING:

- Animals provide draught power in the farming process: help in ploughing, threshing and harvesting the crops; also transport materials from one place to another; are used for running the Persian wheel.
- Important source of food; cows and buffaloes provide milk which is also processed into butter and ghee; cow-dung is a cheap fuel for poor farming families; goats and cattle provide meat and their dung is used as manure; chicken provide meat as well as eggs.
- The livestock sector provides raw material to domestic industries such as hides, skins, wool, animal hair and bones which are used by the leather, woolen textile industries and carpet and rugs industries.
- Livestock contributes about 10% to the GDP.

PROBLEMS/DISADVANTAGES OF LIVESTOCK FARMING:

- Lack of grazing grounds for livestock; more overgrazing.
- Grazing the unirrigated fields causes soil erosion during dry season.
- High prices of animal feed, specially near major cities; gap in prices of livestock products in rural and urban areas acts as limiting factor for further investment in rural areas.
- Inefficient marketing of dairy products due to lack of support by the government; lesser investment and lesser profits.
- Primitive breeding methods lead to poor quality breeds.
- Poor facilities for storage and processing of the livestock output, e.g., meat and milk; serious power shortage crisis since the 1990's has also created difficulties for storage of meat and processing of milk.
- Keeping animals in unhygienic conditions helps spread of diseases.
- Lack of veterinary care experts, vaccination facilities and research institutes; failure in getting healthier varieties with greater yield of milk; poor control of the outbreak of veterinary diseases, e.g., in recent years bird flu led to serious problems for poultry farming.

MAIN LIVESTOCK RESOURCES:

1. CATTLE:

- Most common farm animals.
- Assisted by camels and mules to plough, carry fodder and workers from one place to another on the farm.
- Supply meat and milk and dung that is used as a cheap fuel by poor farmers.
- Traditionally, cattle rearing is a matter of pride and prestige for farmers.
- Mainly reared in areas of Punjab, Sindh and KPK that include Sargodha, Multan, Gujarat, Tharparkar and Lasbela (Balochistan).

2. BUFFALOES:

- Main source of milk and meat; their dung is a cheap fuel for poor farmers.
- Not important as work animals.
- Famous breeds for a good yield of milk include: Nili Bar, Kundi and Ravi.
- Produce about 70% of the total milk supply.
- Prefer to remain in water most of the time and so are mainly found in the canal irrigated areas of the Punjab and Sindh.

3. SHEEP AND GOATS:

- Sure-footed animals, capable of surviving in the rugged terrain and harsh climatic conditions of mountains and deserts.
- Reared extensively throughout in Pakistan including GB in the Northern Mountains, KPK, rural and urban areas of Punjab and Thar, Cholistan and Thal deserts; kept by the nomadic people of Balochistan.
- No large grazing grounds needed; usually keep nibbling at thin grass; however, this may cause overgrazing and soil erosion.
- Source of mutton that is preferred over beef in Pakistan.

4. POULTRY:

- Rapidly growing industry in all parts of Pakistan due to growing population.
- Growing popularity of white meat (chicken and fish) over red meat (mutton and beef) because of its health benefits: white meat has lesser amount of cholesterol.
- Lesser investment required for a poultry farm.
- With growing awareness and concerns about the breeding and feeding of the modern farm chicken, many people have started consuming the "Desi" variety of chicken just as they do for the products of "organic" farming. Apple farm

3: FRUIT FARMING



Apple farm



Apricot farm



Orange farm



Mango farm



Banana farm



Date farm

- Major fruit crops: apples, apricots and a variety of dry fruits are grown on large scale in Swat, Hunza, Murree and Galiat region and in the Northern Mountains; also in the valleys of northern and north-western Balochistan as all these are hilly areas with cool climatic conditions that encourage growth of these fruits.
- In addition to apples and apricots, other fruits such as almonds, grapes and pomegranates are also grown in the cool hilly areas of Balochistan, specially the Pishin and Mastung valleys.
- Bananas are mostly grown in Sindh, specially Hyderabad and neighbouring districts as they grow well in dry and warm climate.
- Mangoes in many parts of southern Punjab like Multan and Bahawalnagar as well as areas in south and east of Hyderabad. Famous brands such as Chaunsa are exported to many countries.
- Dates: usually grown in hot and dry regions of Sindh; also in oasis settlements of Miri, Sharak and the Kech Valley of the Makran Coast in Balochistan; unfortunately most of the production in Balochistan goes waste.
- Oranges and other citrus fruits are grown on large scale in central and eastern Punjab; orange and its special hybrid variety, Kino is grown in Sargodha and neighbouring districts.

Importance of Fruit Farming:

- Source of nutrition and making a balanced diet (rich in vitamins and minerals).
- Raw material for food processing industry to make juices, syrups, jams and jellies.
- Source of diversifying and increasing export earnings.
- Peels/skins of various fruits are used for making important items, e.g., banana-skin for making fabric: a kind of recycling

Factors (Physical and Human) Affecting Agricultural Production

Physical/Natural Factors:

1. Land and soil

- Flat land of the Indus plains and valley areas facilitate large scale/cash crop farming; subsistence farming in the mountainous and plateau regions; terrace farming on hill slopes in GB province.
- Rich alluvial and loess soils suitable for farming.
- The IRS (Indus River System) spreads rich alluvium in the Indus plains.
- Lack of organic matter (nitrogenous compounds etc.) in Pakistani soils is overcome by adding fertilizers.

2. Water and Climate:

- Northern Punjab, e.g., Potwar Plateau and mountain valleys in KPK and GB province receive good amount of rainfall; Barani farming/rain fed agriculture is possible.
- South of these areas irrigation is essential for large scale farming due to ineffective rainfall.
- Heavy Monsoon and glacial melting feed the rivers that flow to the Indus plains; reservoirs on these rivers are needed.
- High summer temperatures suitable for Kharif, and mild to low temperatures of winters suitable for Rabi' crops.

3. Pests, Insects and Diseases:

- LCV (Leaf Curl Virus) and other harmful insects and pests may destroy the crop.
- Usually subsistence farmers are more vulnerable as they cannot afford modern pesticides and insecticides.
- On commercial farms a long term preventive and curative strategy is adopted to deal with pests and diseases.

Human Factors:

1. Irrigation Facilities:

- Semi-arid to arid climate in Pakistan; need of irrigation for cash crop farming.
- Reclamation of desert lands of Punjab and Sindh has increased the agricultural area.
- With modern irrigation crops can be grown twice/thrice a year; a variety of vegetables can be grown 10 times a year.
- Extension of irrigation to some parts of Balochistan, e.g., Lasbela plains: cotton cultivation is possible.

Advantages:

- Make up the deficiency and unreliability of rainfall.
- Ensure a better yield of crops.
- Source of reclamation of deserts.
- Suitable for large scale farming.

Disadvantages:

- Subsistence farmers cannot afford it.
- If canal banks are unlined, problems of water logging and salinity.
- Inefficient system of cleaning of canals/desiltation.

2. Fertilizers:

- Add rich nutrients to soils that lack organic components.
- Phosphate and nitrogenous brands are popular.

Advantages:

- Ensure a better yield by enhancing soil fertility.
- Speed up the process of growth.
- Suitable for cash crop farming; sugarcane needs a mix of manure and potash-rich fertilizers.

Disadvantages:

- Poor farmers cannot afford them.
- Cause water pollution as they mix with the irrigation water.
- Problem of eutrophication: stimulate growth of tiny plants like algae that may cover the surface of a water channel; marine life is deprived of adequate amount of oxygen and sun and so, more water pollution.

3. Mechanization:

- Tractors, harvesters and threshers began to replace wooden plough and other traditional devices.
- Other machines include, tillers, reapers and transplanters for rice.
- Large scale mechanization in the 1960's as part of Ayub Khan's Green Revolution.

Advantages:

- Speed up various processes of crop cultivation.
- Harvesters, threshers and other machines can be attached to a tractor.
- Lesser number of workers required on a farm.
- Suitable for large scale/cash crop farming.

Disadvantages:

- Not suitable for subsistence farmers and fragmented holdings.
- Expensive for poor farmers.
- Diesel causes air pollution.
- Unemployment as only a few people are needed to use such machines; this leads to rural to urban migration.

4. HYV (High-yielding Variety) /GM (Genetically Modified) Seeds:

- Part of Green Revolution of Ayub Khan in the 1960's.
- Need grew due to a rapidly growing population.
- Lesser yield from the 'Desi' variety of seeds.
- Nayyab for cotton; Mexipak for wheat and Irripak for rice.
- Later more varieties introduced.

Advantages:

- Increase crop yield significantly.
- Drought-resistant, pest-resistant and insect-resistant.
- Ensure a longer and stronger stem that can withstand stormy winds.

Disadvantages:

- Expensive, so cannot be afforded by poor farmers.
- Need more irrigation and chemical fertilizers.

5. Size of Farm:

- Uneven distributions of land holdings in Pakistan.
- A small percentage of rich land owners possess huge land holdings.
- Most of the poor farmers have fragmented holdings.
- Research cannot be conducted on fragmented holdings; loans cannot be taken against them; use of machinery and canal irrigation is not possible on them.
- In order to ensure a fair distribution of land holdings, the land reforms of 1959, 1972 and 1979, were introduced.
- Under the reforms, an upper limit of landownership was fixed: land ceiling; similarly, fragmented holdings were joined together under the Land Consolidation Act.
- Poor rate of success of land reforms due to the powerful social position of the rich landed aristocrats many of whom are always members of the Parliament; for the same reason, rights of the tenant cultivators could not be implemented fully.

Agriculture and Environment

Chemical fertilizers:

- Rich nitrate ratio in soil and water channels cause water pollution and other problems: growth of tiny plants like algae on river bed; more oxygen consumed by them and little oxygen for fish; domestic water supply carries pollutants that cause health problems for humans.
- Crops use up soil nutrients; cattle manure becomes high nitrogen slurry that is much more polluting than domestic sewage
- Unusual growth of plants on river bed and around the river restrict/limit exposure to sunlight

Insecticides and pesticides:

- Weaken human immunity; more chances of infectious diseases; many of these chemicals have been proven to be carcinogenic/cause cancer; with time various pests and insects develop resistance against these chemicals; so, more powerful chemicals are required; serious health hazards to farmers and those consuming the crops; farmer's hands and respiratory system are vulnerable to all these chemicals.
- Exposure of soil to wind/water causes soil erosion; deforestation causes more erosion on a level ground; after harvesting, loss of topsoil, thus lesser fertility of soil; if the land is left fallow/given rest, more soil erosion.
- Irrigation causes waterlogging and salinity if the canal banks are unlined; unusual water loss, damage to the fertile soil and additional cost of solving the problem.

Sustainable Development with Agriculture

Practicing agriculture in such a way that there is more crop yield, healthier animals and minimum damage to environment so that needs of the future are secured. Following measures are needed for this:

1. Developing highly productive and environment-friendly/eco friendly techniques so that sustainable growth is achieved.
2. Reclamation of deserts by irrigation schemes.
3. Conserving land by avoiding poor farming practices and overgrazing; launching soil management schemes through afforestation to minimize soil erosion; discouraging

deforestation on the hill slopes; avoiding over cropping/multi-cropping as this causes exhaustion of soil nutrients.

4. Introducing organic farming on large scale to encourage biological processes (e.g. bacterial growth in soils) instead of chemical processes like use of chemical fertilizers.
5. Training and educating farmers to adopt techniques aimed at conserving the physical environment while enhancing crop yield; also training farmers to avail the residual moisture of soil in semi arid and Barani areas.
6. Use of solar powered tubewells and tractors to minimize air pollution.
7. Setting up agricultural research institutes to find ways of increasing crop yields without excessive use of chemicals.
8. More veterinary care institutes needed; research for cross-breeding and early weaning should be conducted to get healthier varieties of livestock; incentives to be offered to attract investors for setting up modern dairy farms.

Sample Question:

Read the following two statements.

Statement A: It is important to develop organic farming on extensive scale in Pakistan as it is more eco-friendly.	Statement B: Due to a rapidly growing population it is important to continue modern farming methods.
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Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

Organic farming relies mainly on biological/natural inputs and processes making it more eco-friendly and beneficial for human health. However, it is not possible to practice it on large scale. Desi seeds are more vulnerable to pests and insects attacks causing huge losses. Use of natural manure may not be increased beyond a certain limit. Therefore, modernization of agriculture is a better option when we need to feed a growing population as well as provide raw material to agro-based industries. About 60% of Pakistan's export earnings are from cotton textile sector. Research institutes like The University of Agriculture, Faisalabad and The University of Arid Agriculture, Rawalpindi and The Cotton Research Institute, Multan are already conducting research to maximize agricultural output and minimize the adverse effects of using chemicals on large farms. Solar-powered tubewells and tractors can significantly reduce air pollution. Farmers should be provided technical and quick financial support to enable them to enhance agricultural output and learn modern farming and eco-friendly techniques.

CHAPTER 08

POWER RESOURCES

Non-Renewable Resources: Coal, Oil, Gas (Fossil Fuels) and Nuclear

1. Coal:

Extraction and Supply to the Users:

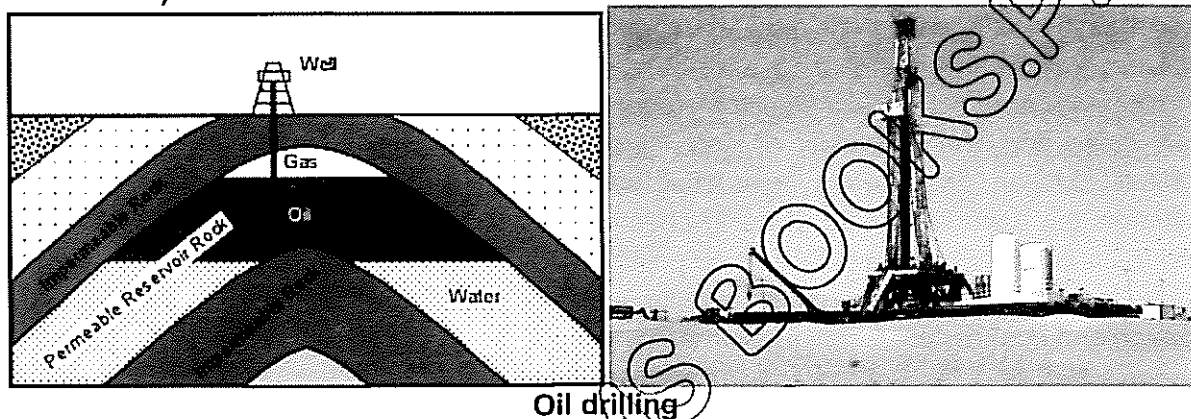
- Mined by open cast/open pit or underground methods
- After extraction, huge amounts are loaded onto trolleys that run on a special track; for smaller amounts donkey carts are used to take the coal out of the mine; divided into categories based on quality and sold to the middleman.
- Transported by truck to brick kilns, cement factories for smaller amounts and shorter distance; used as fuel by these industries.
- For larger amounts and greater distance, rail transport is used;
- It is supplied to power plants for thermal power production.
- Other uses of coal: coke (pure and superior quality coal) combined with iron ore and limestone and heated to get pure iron; coke is mainly imported.
- Coal gases are used by other industries to make fertilizers, solvents, pharmaceuticals and pesticides.
- Also used for cooking and heating where natural gas or other fuels are not supplied.
- Usually, poor coal in Pakistan with high ash, moisture and sulphur contents, and low carbon content with poor heating value: mainly lignite types found in Pakistan; bituminous type in limited quantities.

Why coal as preferred source of power:

- Discovery of new and huge coal reserves in Sindh and Balochistan.
- Uncertainty of prices of oil in the international market; heavy foreign exchange spending on import of crude oil.
- Cheaper than natural gas as fuel for cement mills.
- Gasification of coal to make coal gas: coal is heated with steam and oxygen to make coal gas, a mixture of carbon monoxide, hydrogen and methane; used directly as fuel or refined into more eco-friendly gas fuel; also liquefied coal is used as fuel.

2. Mineral Oil

a) Local Oil



- Extracted by drilling: oil rig/derrick, anticline (dome-shaped rock), reaching the oil trap (gas above, water below); oil is sucked up by pipes; supplied by pipelines to the nearby refinery.

b) Imported oil

- Crude oil from Saudi Arabia, Iran and UAE; Oil tanker reaches the Keamari/Karachi Port or Port Qasim, and berthed at the pier (specially designed platform on the port; the pier has an oil handling system).
- Oil pumped into the nearby refinery, e.g., Pakistan Refinery and National Refinery.
- From refinery to the storage tanks/petrol pumps of various companies within Karachi by pipelines and by road.
- Karachi to the other parts of Pakistan by:

- (i) road and rail tankers; they are expensive, difficult, time consuming and damage the quality of roads.
- (ii) a very long pipeline from Karachi Port to the mid-country refinery at Mahmoodkot, D.G. Khan to transport crude oil; constructed by PARCO.
- (iii) WOPP (White/refined Oil Pipeline Project) to transport refined oil from Karachi to northern Pakistan, runs upto Faisalabad; work in progress for pipeline from Port Qasim to the other parts of Punjab.
 - From petrol pumps, consumers directly purchase refined oil and other products e.g. diesel, lubricants,

Advantages of Oil Supply by Pipelines:

- Fastest and safest.
- Most efficient, cheapest and reliable way.

Disadvantages:

- Huge initial cost to build pipelines for all areas of Pakistan.
- Leakage at any point may be dangerous with an unnoticed loss of oil.
- Vulnerable to the terrorists and their sabotage activities; additional cost of hiring security staff.

Advantages of Oil Supply by Road Tankers:

- Extensive road network, easy supply to remote areas.
- Supply to mountainous areas where pipelines cannot be built.
- Supply of calculated amounts of oil.

Disadvantages:

- Sudden leakage may cause serious accidents.
- Heavy tankers damage the quality of roads; additional cost of repair of roads.
- Unreliable means as supply may be suspended due to heavy snowfall, political disturbances (strikes etc.), traffic jams while passing through major towns and terrorist activities.

Advantages of Oil Supply by Rail:

- Uninterrupted supply as there is no chance of traffic congestion.
- Faster, cheaper and safer than road transport.
- Huge quantities can be supplied to various destinations.

Disadvantages:

- Railway network not extensive; supply to limited number of towns.
- Chances of delay because of poor maintenance of rail tracks and most traffic on single tracks as dual tracks have not been built throughout Pakistan.

Uses of Oil

1. Furnace oil, a by-product of refinery, is used for thermal power plants; fuel for heating, cooking etc.
2. Motor fuel: petrol, diesel for automobile vehicles.
3. As lubricant for engines of automobiles.
4. Valuable by-products: paraffin, waxes, plastics, synthetic rubber, detergents, insecticides, chemical products, pharmaceutical products, furnace oil, bitumen for roads (tar); roofing, water-proofing and surfacing in the construction industry.

Public and Private Sector in Oil Exploration and Extraction

- OGDC (Oil and Gas Development Corporation) working with some foreign companies, since 1961.
- 2000 onwards, a regulatory institute, OGRA (Oil and Gas Regulatory Authority) to monitor oil supply and its prices.
- PEPCO (Pakistan Electric Power Company)
- Pirkoh Gas Company Limited (PGCL).
- Efforts by the government to attract foreign investors in major projects.
- IPPs (Independent Power Producers)
- KESC (Karachi Electric Supply Corporation)
- Rental and SPP

Natural Gas:

Extraction and Uses:

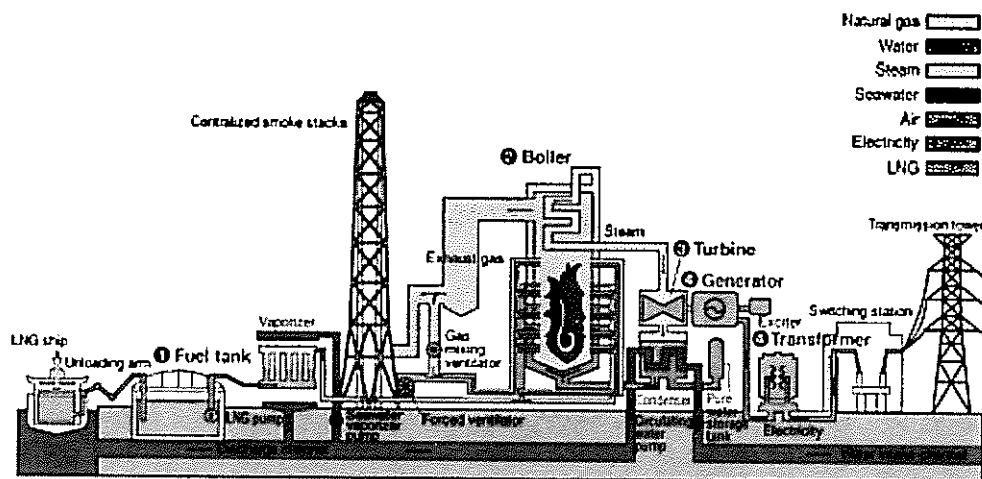
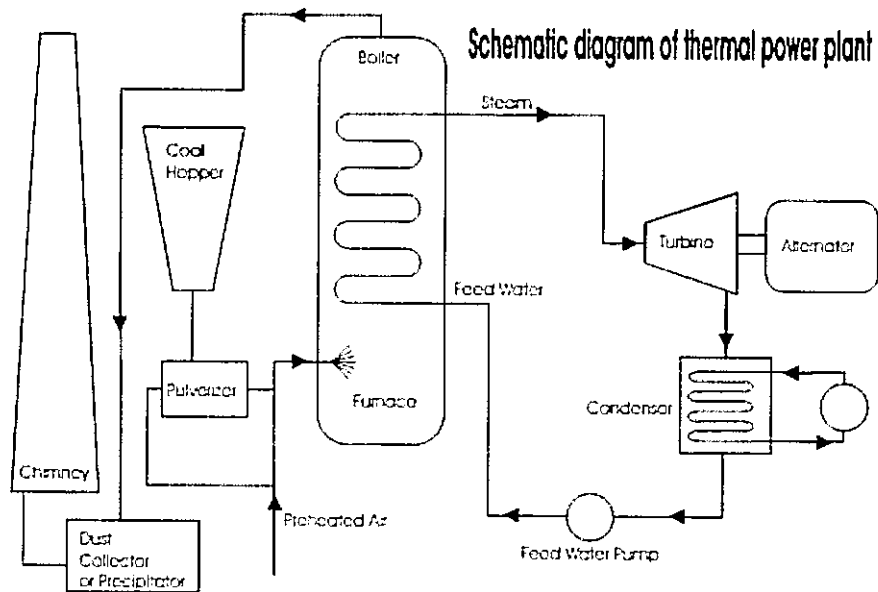
- Extracted by drilling method; major reserves in Sui and Pirkoh, Balochistan; Mari and Kandkot in Sindh
- Used as power resource for thermal power production; most popular fuel for cooking and heating (domestic, commercial scale); as raw material in chemical fertilizers industry; as cheap fuel in cement industry; since the early 2000's as fuel for transport vehicles in the form of compressed natural gas (CNG); being abandoned due to an increasing shortage of natural gas in Pakistan.
- Cheap, easy to use and environment-friendly/eco-friendly.
- Supplied mainly by pipelines; for remote mountainous areas as LPG (Liquefied Petroleum Gas).
- Pipelines: cheapest, safest, fastest mode.
- Cylinders of LPG:

Problems/Disadvantages:

- Dangerous (may explode due to friction on uneven roads), expensive, take more time, unreliable (supply may be suspended due to bad weather, political disturbances e.g., strikes etc.

Advantage:

- Ensures a calculated amount of gas to be supplied and consumed; prevents reckless consumption and waste as Pakistan is facing gas shortage crisis.



Mechanism of Thermal Power Production:

- Burning of fossil fuels (coal/oil/gas) to heat water in huge boilers.
- Production of steam.
- Steam directed towards turbines.
- Rapid movement of turbines, that in turn, spin the shaft in a magnetic field in the generator; electricity is produced by the generator.

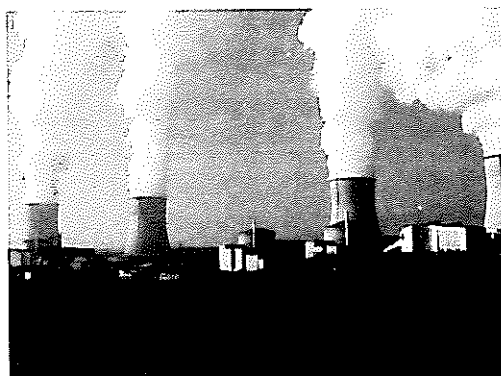
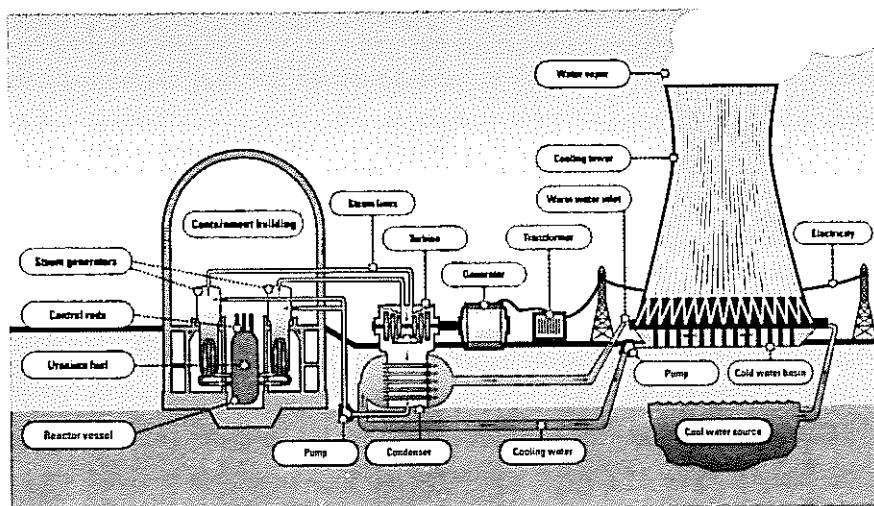
Advantages:

- Plenty of coal deposits in Pakistan.
- No site restriction: can be set up anywhere, though preferably closer to the site of extraction of the fossil fuels.
- Low initial cost.

Disadvantages:

- Non-renewable power resources.
- Not eco-friendly; release of heat and toxic gases like carbon dioxide and carbon monoxide, causing air pollution.
- Mainly poor quality coal; poor quality and lesser extraction of oil; fast depleting gas reserves due to a growing population and demand by the industrial sector.

Nuclear Energy:



Mechanism of Power Production:

- Most powerful and efficient source of electricity production.
- Two possible ways: fission reaction and fusion reaction.
- Split of atomic nucleus by striking it with neutrons
- Huge amount of energy is released in the form of heat
- Heat is used to make steam (as in case of burning the fossil fuels)
- Steam moves turbines
- Rapid movement of turbines, in turn, spins the shaft in a magnetic field in the generator; electricity is produced by the generator.

Fusion:

- Nuclei of two atoms are combined
- Heat released is used to make steam; steam moves turbines to produce electricity.
- Fission method is popular.
- Two power plants working in Pakistan:
 - i. Karachi Nuclear Power Plant (KANUPP).
 - ii. Chashma Nuclear Power Plant (ChasNUPP), near Mianwali.
 - iii. K-2 / Karachi-2, a new nuclear power plant operational in 2020; K-3 to be operational in 2021
 - iv. Only small percentage of total electric power production by nuclear resources.

Advantages of Nuclear Power Production in Pakistan:

- Serious power shortage crisis, especially since the mid-2000's; Pakistan needs urgent steps to resolve this.
- High prices of oil and coal; Pakistan's failure to exploit its own coal deposits, e.g., in Thar and Balochistan due to a lack of political will, political instability and a lack of investment.
- Rapid pace of industrialization resulting in growing demand of electricity.
- Pakistan has the developed infrastructure; already two plants working.
- Lesser chances of accidents as compared to accidents on other power plants.
- Less damaging effects of nuclear power on the environment as compared to the thermal power plants.
- Most efficient method: a small amount of Uranium produces very large amount of electricity.

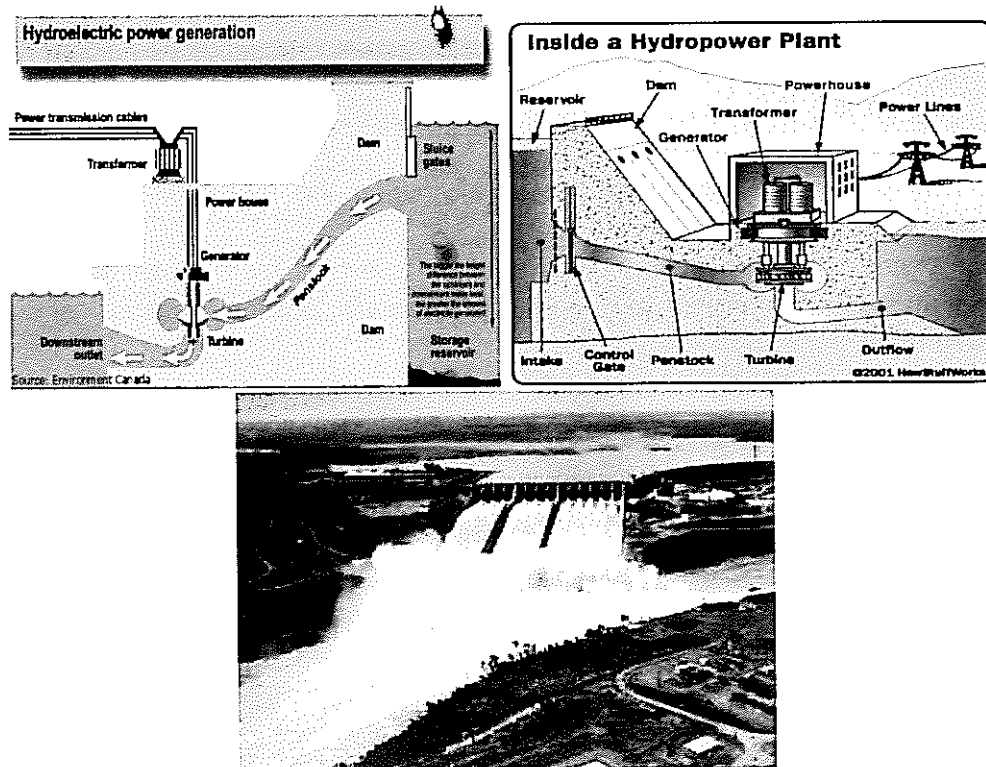
Disadvantages of Nuclear Power in Pakistan:

- Emission of dangerous radiation; workers in nuclear power plants may develop serious diseases e.g., cancer; their children may have genetic deformities.
- Disposal of nuclear waste needs careful handling as it remains radioactive for a very long time.
- High cost of Uranium and power plants; it involves more import spending; Pakistan is already a highly indebted country with a negative BOP (Balance of Payment).
- Availability of alternative renewable resources, e.g., solar energy as there are more than 300 sunny days in most of Pakistan; wind power along an 800 km long coast and deserts; HEP – huge amounts of flood water go waste every year.
- Also, there is potential for wave and tidal energies.

HEP (Hydroelectric Power) Production

Site requirements for HEP Plant

- High mountains
- Huge storage area(e.g., Valley) with steep sides and impervious rocks to minimize water loss
- Fast flowing rivers in areas of heavy rainfall and glaciers to ensure sustained water supply.
- Cool climatic mountainous areas with lesser loss through evaporation.



Mechanism of HEP Production and Power Transmission

- Water falls from high mountains
- Stored in a steep-sided mountainous valley of impervious sides, in a large reservoir.
- Water is passed through narrow intake tunnels and its flow/pressure increases
- It falls on Hydro-turbine from where a shaft goes to the power generator.
- Rapid movement of turbines by the kinetic energy of water.
- Turbines spin the shaft inside a magnetic field in the generator.
- Electric energy is produced from the movement of the shaft.
- Electric current is regulated by the transformer that sends the required voltage through the power transmission lines.
- Transmission lines to the grid stations, then to load centres, and finally to various consumers.

Advantages:

- Renewable power source.
- Eco-friendly: no toxic gases, no heat and so, no air pollution.
- Low running cost.
- Availability of the Indus River System and several mountainous areas with glacial melting.

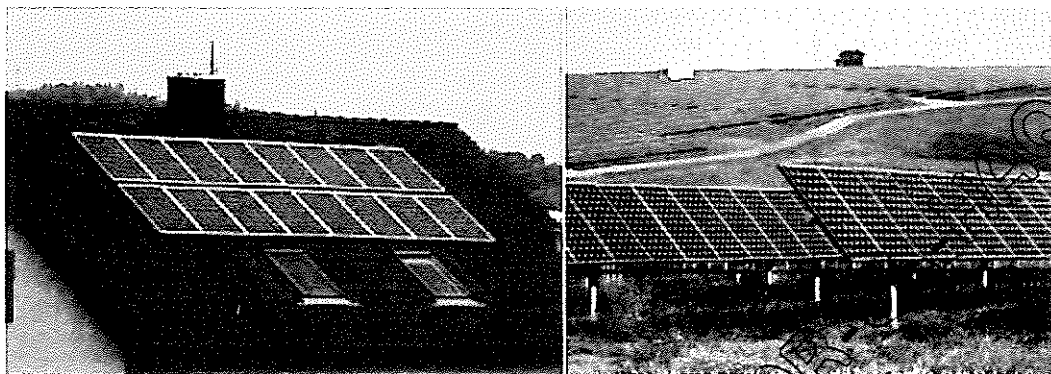
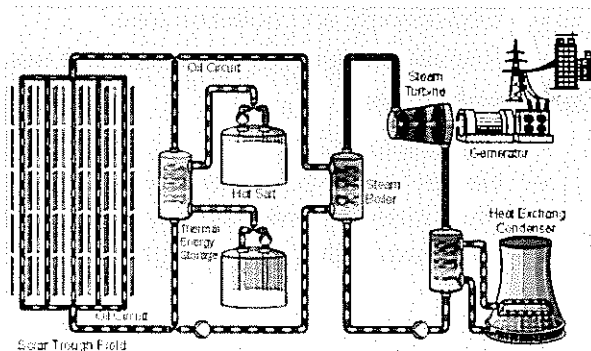
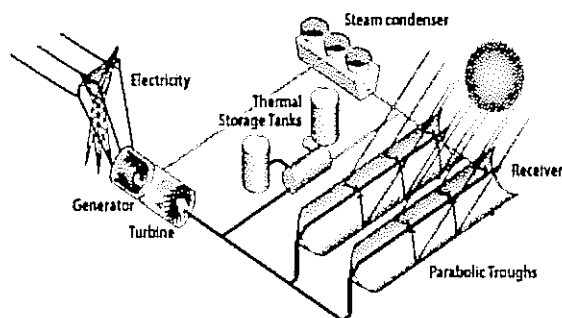
Disadvantages

- Huge initial cost.
- Deforestation for clearing the land.
- Population displacement as it requires a huge area.
- Siltation reduces the capacity of the reservoirs and damages the power production machinery.
- Interprovincial disputes over the building of large dams, e.g., opposition to the Kalabagh Dam by KPK and Sindh.

Alternative Power Resources

1. Solar Power

Diagram 2. Parabolic trough solar power plant



Mechanism of Solar Power Production

- Conversion of sunlight (heat energy) either directly by using photovoltaic cells (PV cells), also called photovoltaics (PV's) or indirectly by using Concentrated Solar Power (CSP).
- PV converts sunlight into electric current using the photoelectric effect.
- Relatively smaller amounts are stored that can power radios, water geysers (to heat water) and even small cars.

- CSP systems use lenses or mirrors and tracking systems to focus on a large area of sunlight and create a small beam that boils water to produce steam.
- This is called solar-thermal electricity.
- Heat energy of steam moves turbines to produce electricity.
- Rapid movement of turbines, in turn, spins the shaft in a magnetic field in the generator; electricity is produced by the generator.
- With 250-300 sunny days, enough potential in Pakistan, but no major plant has been set up so far.
- Can be used for: rural electrification, water heating, tube wells, tractors, motorboats for fishing, and cooking.
- Currently being used for: rural telephone exchanges, highway emergency telephones, refrigerating medicines in hospitals and electric poles on the Motorway.
- The public health department has installed solar water pumps to pump out clean drinking water
- Many PV devices _____ batteries, regulators, modules, calculators, invertors, lamps, lights.

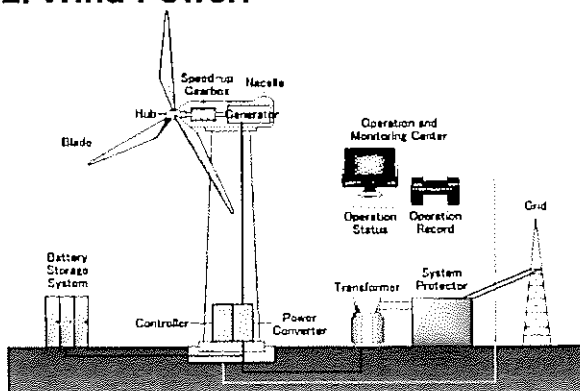
Advantages:

- Safe to install.
- Eco-friendly and pollution free.
- Renewable and efficient source of power production.

Disadvantages:

- Expensive to install.
- Needs further advancements.
- Fluctuation in power supply in cloudy and rainy days.
- No power production at night.

2. Wind Power:



Mechanism of Wind Power Production:

- Conversion of kinetic/motion energy of moving wind into electric energy.
- Wind turbines are rotated rapidly by the kinetic energy of wind.
- Kinetic energy is first converted into mechanical and then electrical energy by the generator in the turbine.
- As such, the mechanical energy may be used to pump out ground water or grind grains.
- Electricity is produced on small or large scale depending on the number of turbines.

- A small wind farm provides electricity to a small, isolated area.
- Larger wind farms with many turbines are connected to the power grid to provide electricity to larger areas.

Advantages:

- Clean, environment-friendly.
- Renewable (constantly available), abundant source.
- Can be used independently and deployed locally in rural and remote areas of Pakistan.
- Wind farms add to the scenic beauty of the area, and may attract tourists.
- Availability of wind turbines in a wide range of sizes according to the requirements.
- Suitable for small scale and cottage and craft industries.

Disadvantages:

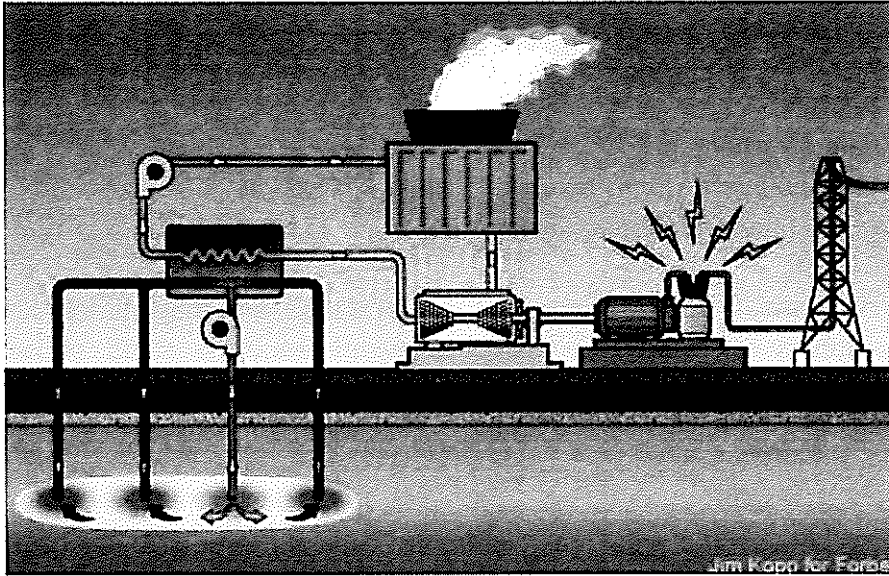
- Variable speed of wind may disturb the pace of power production.
- Such power plants are site-specific; they can better be set up in areas of good speed of wind; difficult to supply power to areas far from the site of wind power plants.
- Expensive to build to provide electricity to large cities.
- Wind turbines can kill birds and thus damage the ecosystem.
- Several hundred turbines needed to produce a reasonable amount of electricity.

Feasibility of Wind Power Production in Pakistan

- Availability of coastal (1000 Km), desert and mountainous areas, with good wind speed
- High population density in the coastal areas, especially the Karachi area.
- Interest shown by the local and foreign investors' private sector and some other countries.
- Gharo Wind Power Plant of 50 MW being set up near Port Qasim.
- Some industrialists are setting up their own plants in the Karachi area.
- Government has set up a plant in the Thar Desert.
- However, power plants are restricted to areas with good velocity of winds.
- Huge area and investment needed; heavy burden of debts already on Pakistan.
- Noise produced from propellers.
- Lack of a strong political will and consistent power policy.

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3. Geothermal Power



- Heat energy of the earth can be used to generate electricity
- Available in the form of very hot water (e.g., hot springs / geysers) or heat deeper into the earth surface.
- The earth's stored heat constantly flows to the earth surface by conduction, and is replenished by radioactive decay at a specific rate.
- Hot water/steam is extracted by drilling, and this is used to move turbines in order to produce electricity.
- In Pakistan, AEDB (Alternative Energy Development Board) is working on the feasibility of developing geothermal power plants.
- Many parts of Pakistan's land are part of a global seismic belt, with a long history of geotectonic events, e.g., northern and western mountains.
- These areas have potential to be used for setting up geothermal power plants.
- Pak needs to: identify sites and estimate cost, size of heat resources.

Advantages:

- Renewable source providing constant power supply.
- Widely spread areas, from the northern to the southern end, suitable for building power plants.

Disadvantages:

- High cost of construction and maintenance
- Site – specific; plants can be set up preferably in the volcanic areas only.
- Threat to the power plants by sudden eruption of lava and earthquake tremors.

Electric Power from Sea Water

Three possible ways:

1) Wave Power:

- Waves are in constant motion due to the energy they possess.
- It is distinct from the diurnal (day/night) flux of Tidal energy and the steady gyre of (deeper) ocean currents.
- We can use wave power for various purposes, e.g., desalination (removing salts) of sea water, pumping water into reservoirs and producing electricity.
- Various ways to exploit the kinetic energy of the waves e.g., waves are allowed to move into a chamber with an inlet and an outlet.

Mechanism:

- The rising water forces air out of the chamber and this moving air rapidly spins a turbine to produce electricity.
- As the waves go down, air flows through the turbine back into the chamber, through doors that are normally closed.
- Thus the turbines keep spinning.
- In another system, kinetic energy of the waves is used to power a piston up and down inside a cylinder
- The piston moves the turbine to produce electricity
- Pakistan can use wave energy of Makran coast but construction and maintenance cost is high.
- Renewable, eco-friendly and clean power resource.

2) Tidal Power

- A form of HEP (Hydroelectric power) production.
- Makes use of the energy of tides.
- Tides rise significantly due to the force of the gravitational pull of the moon.
- Usually, they rise diurnally (twice a day), coming in and out of the shore.

Mechanism:

- Tides coming into the shore are trapped in a reservoir behind a dam
- The dam includes a sluice that is opened to allow the tide to flow into the basin; the sluice is then closed.
- As the sea level drops, traditional HEP (Hydroelectric power) production mechanism is used to generate electricity (by rapid movement/spin of turbine) from the elevated water in the basin.
- A huge increase in tides is needed: at least 16 feet between low tide and high tide, in order to provide enough energy to move the turbine.
- Only some plants working in the world, e.g., in France.
- In Pakistan, NIO (National Institute of Oceanography) and AEDB (Alternative Energy Development Board), working on tidal power projects.
- Tidal basin of the Indus Deltaic Creek system has good potential for tidal power production.
- It's a 170 Km creek system (tidal basin) where tides flow at high speed.

Advantages:

- Renewable power resource.
- Sustained power production without any pollution.

Disadvantages:

- Highly expensive for Pakistan.
- May have adverse effects on marine and wildlife habitats.
- Possible disruption of the ship movement system if alternative arrangements not made in advance.
- Siltation may also occur.

3) Ocean Thermal Energy (not part of syllabus but for a better knowledge about power production)

- Temperature difference of sea surface and deeper part
- Surface warmer and deeper part cooler
- A difference of 38°F is needed to produce electricity
- Operational only in Japan and Hawaii (USA).

Biomass / Biofuels

Biomass:

- Organic material, obtained from living and decaying plants is called Biomass. e.g., microorganisms, plants, agricultural residue.

Biofuel:

- A renewable source of power produced from Biomass, e.g., biodiesel, vegetable oils.
- The ultimate goal of Biofuels is to supplement or replace fossil fuels (non-renewable resources that are rapidly declining and have the poisonous "green house effect").

Types of Biofuels

Mainly, solid biomass, liquid fuels and various biogases.

1st generation Biofuels:

- Sugar, starch, animal fat, vegetable oils.
- Seeds or grains e.g., sunflower seeds are pressed to get oil
- This vegetable oil is used in Biodiesel
- Also, starch from wheat is fermented into Bioethanol (Ethyl alcohol).

2nd generation Biofuels:

- Non-food crops
- Waste Biomass, stalks of wheat, corn and wood.
- Mainly in liquid form, e.g., Cellulosic Biofuels.

3rd generation Biofuels:

- Combined versions of "bio-chemical" and "thermo-chemical" processes.
- Examples: Pyrolysis, gasification and genetic manipulation of organism to secrete hydrocarbons.

Mechanism of Electricity Generation from Biofuels:

A variety of primitive, simple and advanced methods.

- Waste Oil**, e.g., sunflower etc. is collected and heated (to reduce its viscosity) and filtered to remove unnecessary residue.
 - Biodiesel is ready to power a car engine or generate electricity
 - Another method is fermentation to obtain Ethanol; it can be produced from Biomass containing carbohydrates.

ii. Direct burning:

- Oldest and simplest way-by burning (direct combustion) in boilers to produce high pressure steam.
- Steam moves turbines and thermal electricity is produced.
- Most biomass power plants use this method.
- Co-generation: steam from the plants is captured to heat water and buildings.

iii. Co-firing:

- Burning Biomass with coal.
- Highly economical way, because the existing power plant equipment is used without major changes.
- Co-firing allows electricity generation more efficiently.

iv. Gasification:

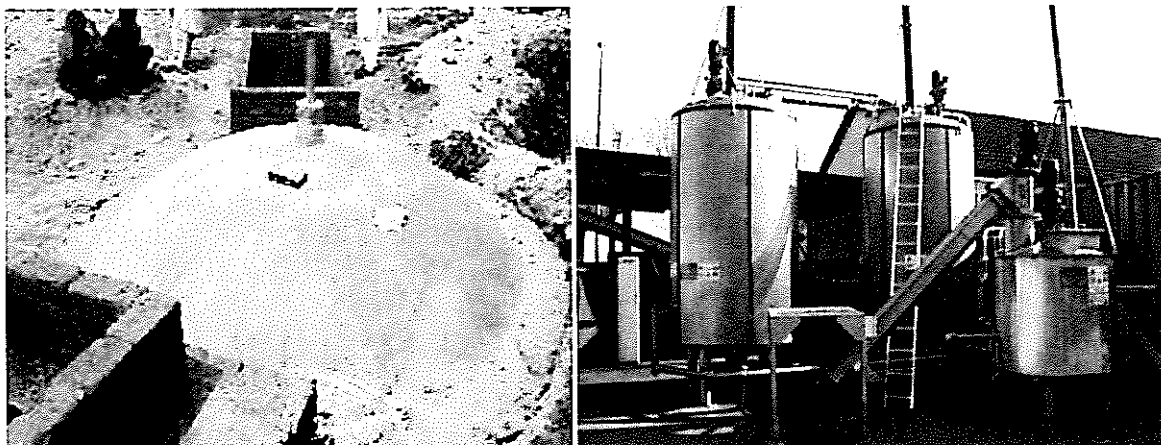
- Making gas fuels by heating solid biomass at high temperature in an oxygen-free environment.
- Gas is used to move turbines to produce electricity.
- In Pyrolysis, a gas rich in methane is produced.
- The gas is cooled to make an oil-like liquid (Bio-oil), which is burned to produce steam that moves turbines to produce electricity.

v. Biogas from anaerobic digestion/decomposition:

- Breaking down of organic matter by bacteria in the absence of oxygen (anaerobic conditions).
- Biogas is produced as a waste product.
- Biogas is collected and used to heat buildings, run engines or produce electricity.
- Produced naturally in city dumps and landfill sites as waste is buried and digested by bacteria.
- Now, also produced by mixing plant and animal waste with water in oxygen-free tanks.

Most primitive use of Biomass in Pakistan

- Cow-dung cakes: Dried up animal dung by rural communities and used as simple fuel at home.
- Gradually evolved the idea of electricity production by biogas.
- Many adverse effects, e.g., bad smell and pollution leading to various respiratory diseases.
- Also, highly inefficient.
- Now at some places in Pakistan, a number of Biogas plants are operational.



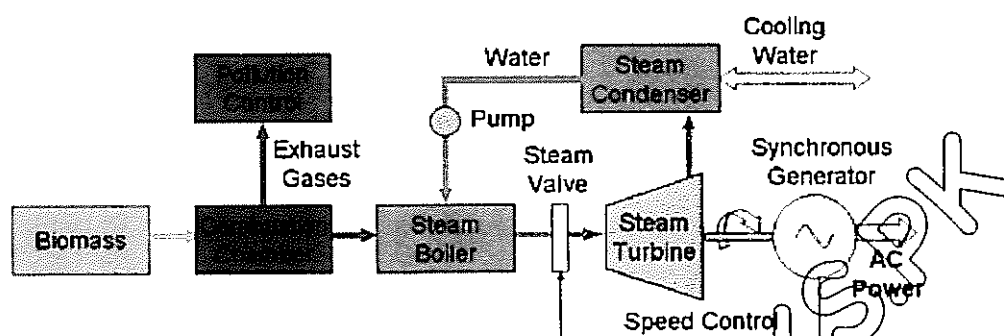
Traditional Biogas Plants in Pakistan

Advantages of Biofuel Energy Production

- Renewable source with sustained power production supply.
- Reduced emission of greenhouse gases, e.g., oxides of carbon.
- Whatever carbon dioxide is produced, most of it is consumed by the growing plants.
- Effective means of recycling as a variety of wastes are gainfully re-used.

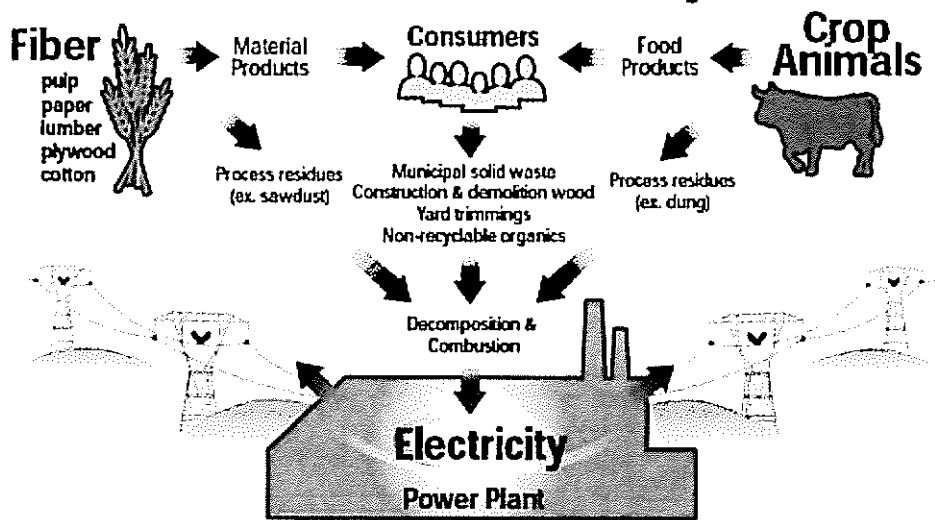
Disadvantages:

- More land needed for growing Biofuel crops; already less land available in Pakistan for major crops and forests.
- Pakistani's soil is already deficient in organic matter; the available organic matter, if used for power on large scale, may exhaust soil's nutrients seriously making it less fertile.
- A very long term project with a comprehensive planning.



Electricity Generation Powered by Biomass

Biomass to Electricity



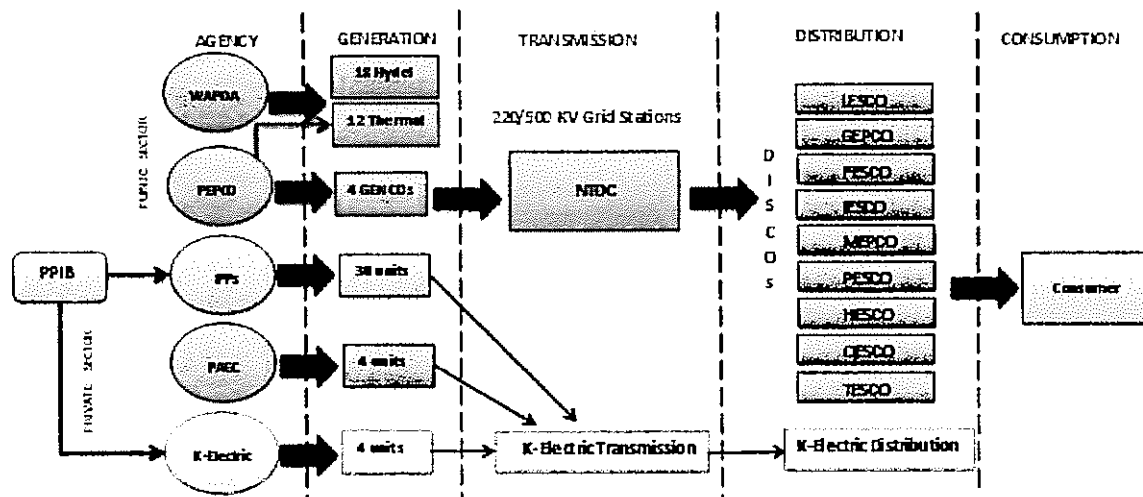
Electricity generation, Transmission and Distribution in Pakistan

- Early 1960's: WAPDA (Water and Power Development Authority) and KESC (Karachi Electric Supply Corporation) to produce transmit and distribute power.
- 1970's, Karachi Nuclear Power Plant (KANUPP) for nuclear power supply to Karachi.
- 1990's, a number of IPP's (Independent Power Producers) e.g., HUBCO, also for power production.
- 2000's (during Pervez Musharraf's rule), additional bodies, e.g., NEPRA (National Electric Power Regulatory Authority) to regulate working of various power production and distribution bodies.
- Also, as part of transition of WAPDA and KESC from beaurocratic to corporate institutes, involvement of PEPCO (Pakistan Electric Power Company) Ltd.
- Works with other subsidiary companies e.g., LESCO (Lahore Electric Supply Company), IESCO, FESCO etc.

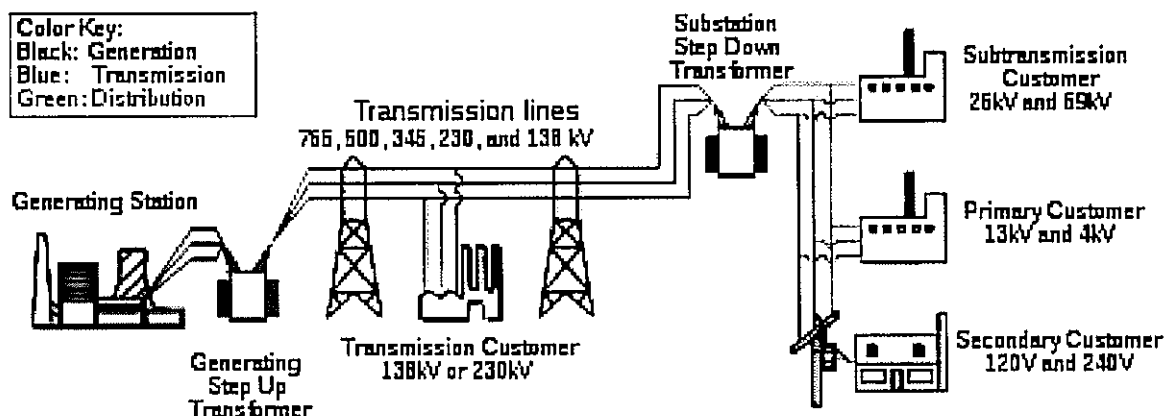
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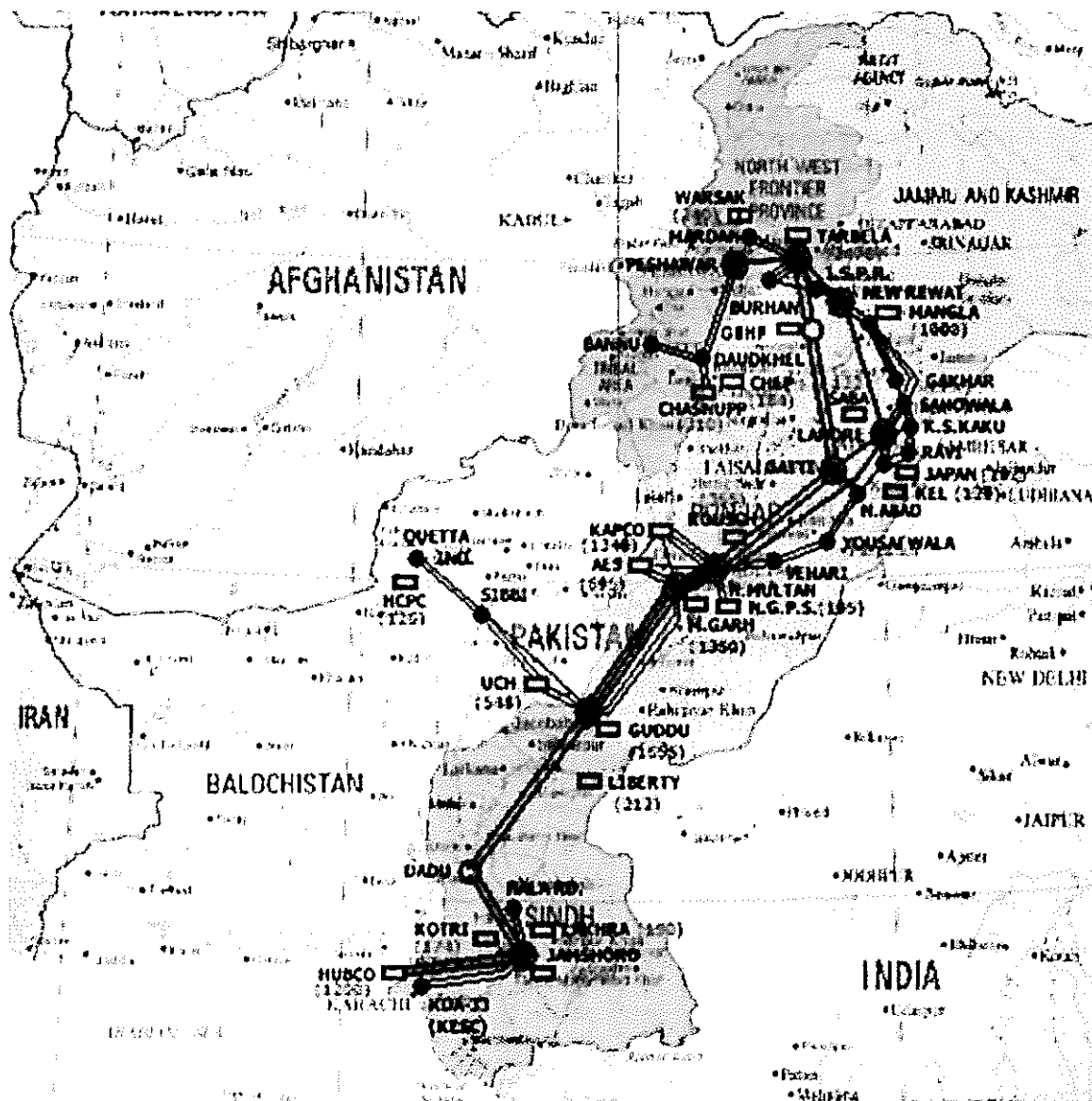
National Grid System of Pakistan: Power Transmission to Various Sectors of Economy/Consumers

Structure of the Power Sector



Illustrated by: M. Qureshi





- National Grid connects HEP production in northern and thermal power generation in southern Pakistan, managed by WAPDA, KESC and now also, by PEPCO.
- From power plants to grid stations to load centres to domestic, commercial and industrial consumers.
- Transmission lines connect all these components.
- Power supply according to the needs of different areas, not in proportion to their own power generation capacity.

Reasons for Inadequate Power Generation and Transmission: Frequent power breakdown and load shedding

- Many power plants not working fully due to lack of finance, technical expertise and proper maintenance.
- Decreased HEP in winters; lesser rainfall and little/no glacial melting, causing reduced water flow of rivers.
- Siltation in reservoirs; reduced capacity to store water and produce HEP; also damage to power generating machinery.

- Lines losses due to long transmission lines from the National Grid
- Power theft, especially in big cities and tribal areas; e.g., 41% loss incurred by the KESC alone.
- Delayed/non-payment of power utility bills by many public sector bodies; additional burden on PEPCO.
- Corruption, inefficiency and poor maintenance service of WAPDA staff, e.g., meter tampering.
- Rise in prices of oil and coal causes increased cost of power production.
- Growth in demand due to industrialization, urbanization, improved standard of living and rural electrification, against slower pace of power production.

Effects of Power Breakdown/Load Shedding on Industry and Trade

- Decreased industrial output and poor quality of production.
- Increased cost of production due to: continuous repair and maintenance of machinery, provision of standby power units, e.g., generators, payment of fixed wages and salaries despite additional expenses.
- Chances of loss of labour if their wages are negotiated.
- Chances of closure of the industrial units in case of an unusual drop in profits.
- Failure to meet the deadline for exports due to reduced working hours.
- Damage to the reputé of exporters; lesser export earning and, therefore, a more negative BOP (Balance of Payment).
- Difficult to compete with other countries in terms of quality of the products.

Rural Electrification

Need and importance/Advantages:

- Installation of tube-wells for irrigation and controlling waterlogging and salinity; improved agricultural production.
- Development of cottage and small scale industries; creation of jobs in rural areas; development of rural areas and improved standard of living by a better sale of cottage industry products and more employment in industries.
- Huge potential for solar and biogas/biofuel power plants.
- Improved literacy and awareness due to access to information technology and telecommunication (TV, Internet etc).
- Lesser chances of rural to urban migration due to a reduced disparity between rural and urban areas.

Hindering Factors/Disadvantages of Rural Electrification

- Remoteness of many villages of KPK and Balochistan from the National Grid
- Lack of funds and mismanagement of financial resources by the government/public sector bodies.
- Poor economic feasibility to electrify small villages of very low population density.
- More chances of power theft.

Sustainable Development of Power Resources:

This means to ensure availability of power resources for future while minimizing adverse effects on environment. This can be achieved by:

- Using advanced technology to develop renewable resources.
- Preventing waste and non-productive use of power resources.
- Improving repair and maintenance.
- Minimizing power loss by setting up new power plants and eradicating the evil of power theft.
- Urgent steps to use renewable and eco-friendly power resources, e.g., solar and wind.
- Creating awareness among people about minimizing the power waste.

New Pattern Question

Statement A:

Pakistan should exploit its huge deposits of coal in Sindh and Balochistan to produce power. It should also increase the nuclear power production.

Statement B:

Using the renewable resources will be a better option for Pakistan to produce electricity.

Q: Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

Pakistan can produce sufficient power from the Thar, Machch and Sor coal deposits. Moreover, nuclear power plants are already operational in Karachi and Chashma. However, the quality of Pakistani coal is usually poor causing more air pollution. Raised oil prices in the world make power production in Pakistan more expensive. Therefore, use of renewable resources should be preferred as they are more abundant and easily exploitable in Pakistan. The feasibility report of the Kalabagh Dam is complete and only the reservations of Sindh and KPK need to be addressed. Work on Diamir Bhasha Dam should be sped up. Small HEP dams can also be set at multiple sites. Moreover, wind power plants on the coast can resolve the power shortage crisis. With more than 300 sunny days Pakistan can produce solar power in most of its areas. Thus, by utilizing the renewable power resources, Pakistan can produce surplus electricity, overcome the power shortage crisis while conserving its environment.

Past Paper Question:

“The natural gas field discovered at Sui is considered to be one of the largest in the world.” To what extent is further development of the natural gas industry possible in Pakistan? Give reasons to support your judgement. You should consider different points of view in your answer. [6]

Ans.

Pakistan can extend the network of gas pipelines and gas-fired thermal power stations. This will reduce the imports of oil and coal. In mountainous regions and areas of low population density the pipelines can be over-ground in order to cut down the price of supplying gas. By doing this deforestation can be reduced significantly. Pakistan can invest in finding more gas reserves as this will create many jobs and ensure the development of such areas with a consequent improvement in the standard of living of the local population. However, huge funds are needed for such development projects, and Pakistan may have to take more loans from donor countries and agencies like the IMF (International Monetary Fund). Rugged landscape of mountainous regions and Balochistan, and heavy snowfall with landslides will restrict the exploration projects. Terrorists and insurgents in Balochistan and tribal areas may sabotage such development schemes. With projects like CPEC, and investment by local and foreign investors, Pakistan can develop gas industry significantly.

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CHAPTER 09

SECONDARY AND TERTIARY INDUSTRY

SECONDARY INDUSTRY

Types of Industries:

- **Primary industry:** related to collecting / making available natural products e.g. those obtained from fishing, mining, forestry and agriculture.
- **Secondary industry:** converts raw materials supplied by the primary sector/industry to form a semi - finished/finished product.
- **Tertiary industry:** consists of various services, e.g., tourism, education, entertainment, security, health, banking etc.

Secondary industry as a System with Inputs, Processes and Outputs

Inputs:

- Capital: funds and machinery.
- Land for building the industry
- Power to provide light and run various machines.
- Raw material to be converted into a new product.
- Labour: unskilled, semi-skilled and skilled workers for various jobs.
- Enterprise: planning the project of industry.

Processes:

- Smelting (melting metals at high temperature),
- Spinning to make cotton yarn.
- Weaving to make cotton fabric/cloth; knitting, stitching and packaging.
- Also carding and pressing the cotton bales.
- Dyeing the cotton fabric.
- Crushing, mixing and heating of raw materials in cement industry.

Outputs:

- Processed and manufactured goods, e.g., cement, sugar, cotton, yarn, footwear.
- Many products become raw materials for other industries or sold directly to the consumers, e.g. bottles, cloth, nuts and bolts.
- Some products are solely used as raw materials for other industries e.g., axles, machine parts etc.
- Consumer goods e.g. drugs, washing machines, bakery products.
- Products of construction industry, e.g. cement, iron grids and bricks, for building offices, houses and other buildings.
- Profits earned from the sale of these products are invested back as capital.

Raw Material:

It is the basic ingredient that undergoes changes to become a new product that may be partly or fully finished or refined.

Types of Raw Material:

- **Renewable:** agricultural output, e.g., wheat grain, milk and hides; products of fishing and forestry, e.g., wood and fish; water, wind and sunlight as power resources.
- **Non-renewable:** coal, oil and gas for power; metallic and non-metallic minerals, e.g., iron ore, chromite, limestone, rock salt for various large scale industries.
- **Secondary Products:** various processed products, e.g., cotton yarn and wheat flour; manufactured products, e.g., cotton cloth, engine, steel coils and machine parts.

Value Addition:

It is a phenomenon in which the quality of a product is further improved to add to its value so that a greater profit is earned from its sale. For example, from raw cotton to cotton yarn to cotton cloth to readymade garments; from iron ore to pure iron to steel to a huge variety of instruments and machinery.

Industrial Infrastructure:

It is a set of essential prerequisites to develop an industry. It includes capital investment, roads, railways, power, gas and water supply and sewerage.

Factors for Locating an Industry:

- **Physical:** natural routes of access for speedy transport of goods and workers; site requirements: flat and well-drained land.
- **Human:** raw materials, capital, power supply, skilled labour, industrial linkages and government policies, e.g., concession in taxes; closer to the market, port/airport and areas of raw material production by road and rail links.

Consumer goods:

- These are the products/goods bought directly by the consumer for consumption. They are the end products of production, processing and manufacturing.
- Examples: electric fans, refrigerators, TV sets, mobile phones etc.

Capital goods:

- These are the assets used by businesses in the course of producing their products and services. This means they are used to manufacture/produce consumer goods.
- Examples: machinery, tools, equipment, spare parts etc.

TYPES OF SECONDARY INDUSTRY:

- I. Small scale cottage/craft industry: family/home based industry not using modern technology; belongs to informal sector.
- II. Small and medium scale industry: uses modern technology, organized into firms / companies with plants / workshops and offices.
- III. Large scale factory industry: converts raw materials into finished/ manufactured goods; involves greater degree of automation; ensures standardized mass production on large scale; requires huge capital investment and area; employs several hundred/thousand workers; belongs to formal sector.

Differences between Formal and Informal Sector Industry

Formal Sector	Informal Sector
• Employment by the institution • Capital intensive: uses mainly modern machinery with fewer workers • Registered with the government. • Mainly male workers. • Regular working hours and well defined wages/salaries. • Better quality good in a better environment. • Work in properly built factories.	• Self-employment • Labour intensive: mainly manual work, less use of machinery • Uncertain/variable wages • More female workers • Usually unregistered • Irregular working hours • Low standard in quality of goods • Usually located at homes

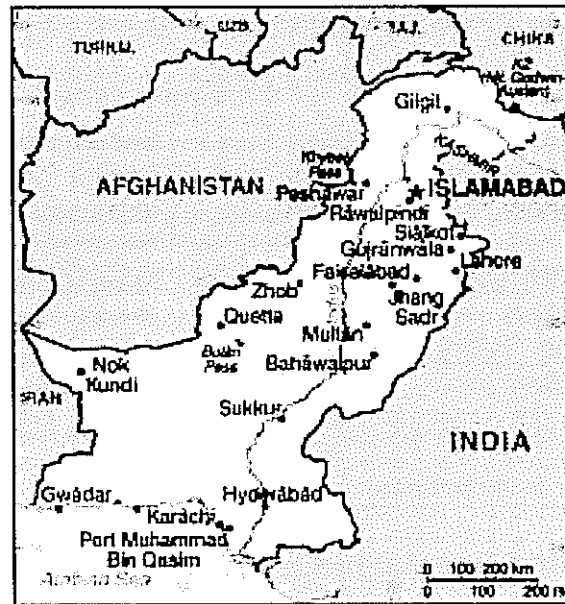
Industrial Estates and Special Industrial Zones

Why set up: to boost industrial development, attract investment, encourage entrepreneurs by offering them incentives.

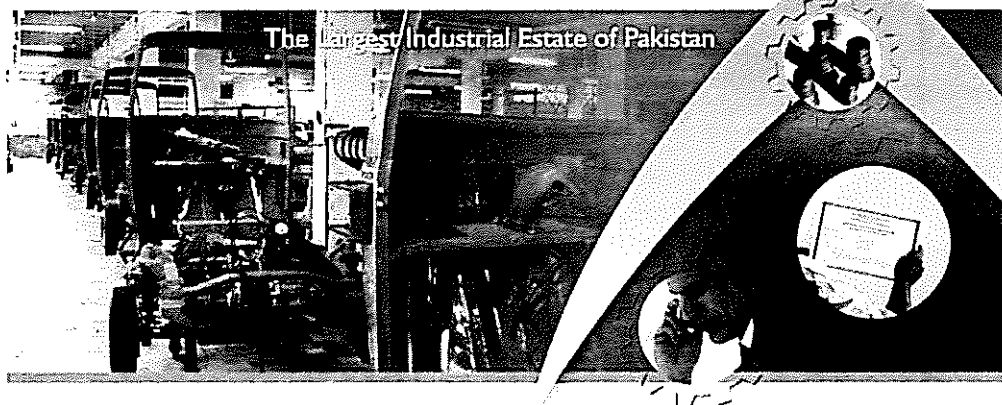
What is an industrial estate?

- Areas reserved exclusively for various industries.
- Infrastructure developed by the government: power, gas, water and sanitation, roads, workers' colonies with the health and education facilities.
- Incentives offered to industrialists, e.g. cheap rate of power and gas supply, land and concession in taxes on sale, imports and exports.
- Private sector is encouraged to develop its own power plants.
- Examples: SITE (Sindh Industrial Trading Estate), Karachi; Sunder industrial Estate Lahore etc.
- Special industrial zones: same as industrial estates except that the infrastructure facilities that the investors are encouraged to develop.
- Incentives same as those for estates.
- Examples: proposed zones along the Motorway.

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M-3 Industrial City FAISALABAD



Supportive Government Policies

Responsive Government
Liberal Investment Policies
Attractive Tax/Tariff Incentives
Comprehensive duty-free facilities for investors
No Government permissions required

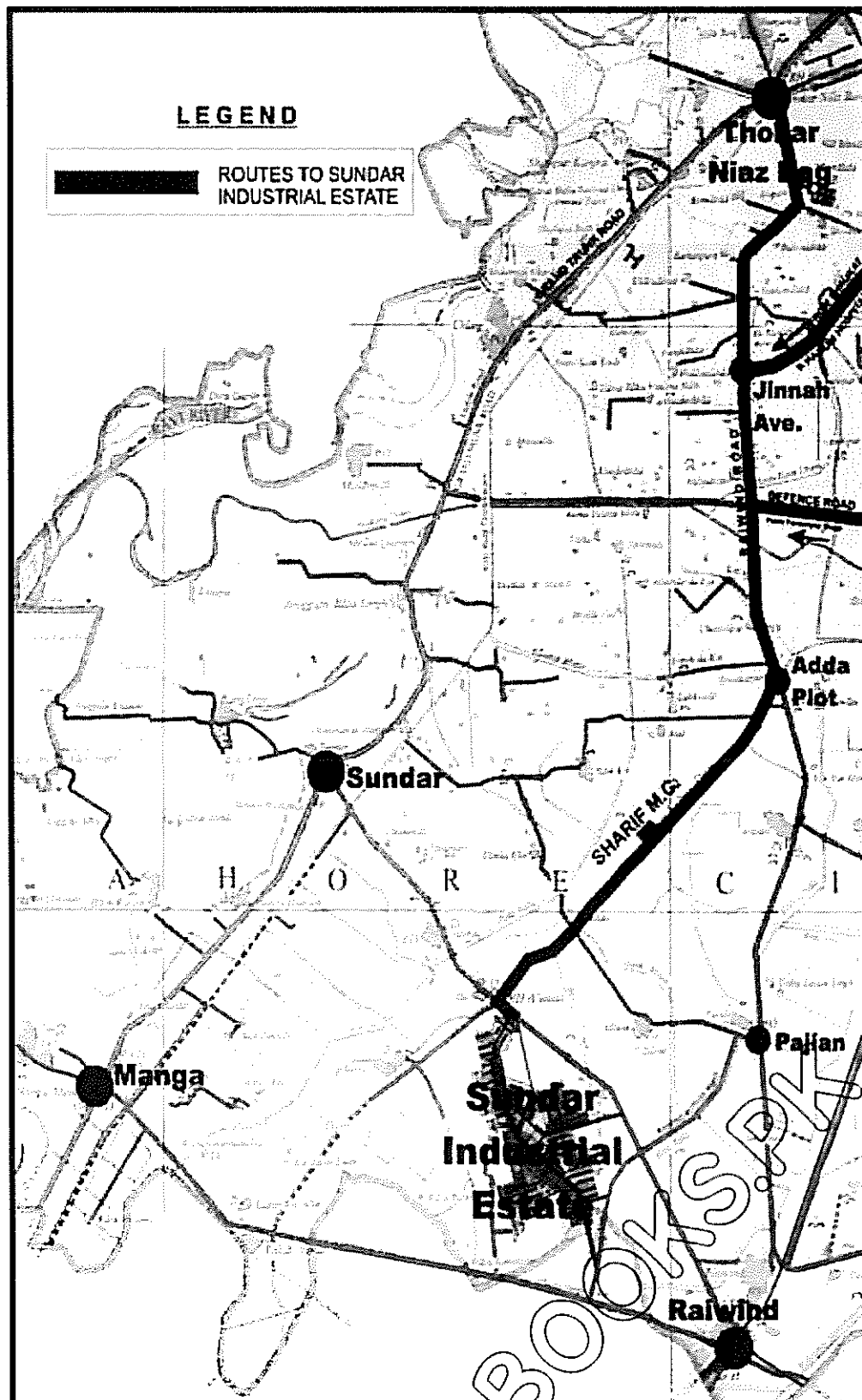
A Revolution 17.7 million square meters wide
Where Profits are High



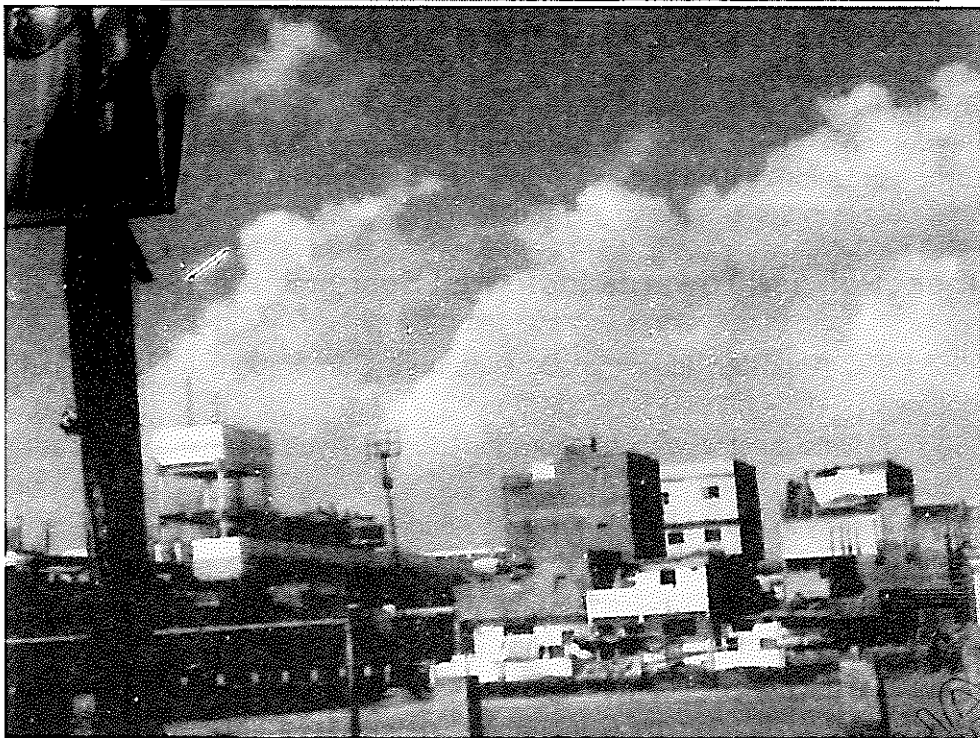
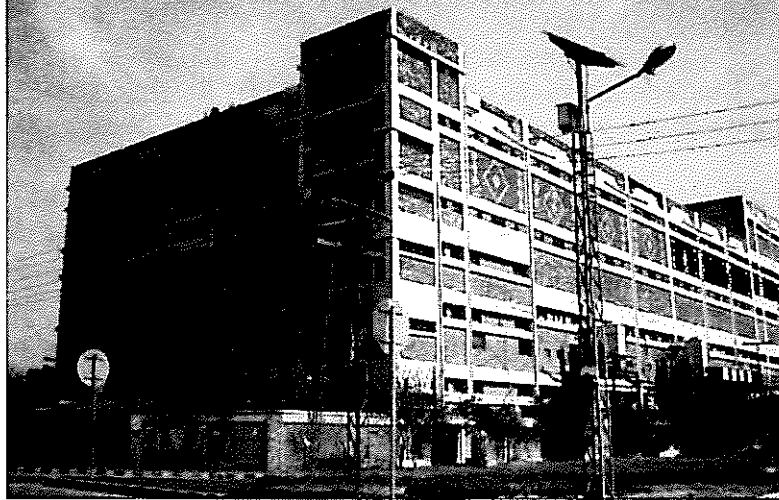
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Township Industrial Estate, Kot Lakhpat, Lahore



Advantages of Industrial Estates:

- Large scale employment.
- Growth of industries.
- Attraction of investors through a variety of incentives: reduced taxes, cheap rates of land, power and gas.
- Improved quality due to competition between various owners of the same industries.
- Potential for export if industrial production exceeds local needs.
- Improved GDP (Gross Domestic Products) and GNP (Gross National Products).

Disadvantages of Industrial Estates:

- Deforestation on large scale as a huge clear area is required.
- Huge investment needed.
- Pollution of various types on large scale: air, noise, water and land.
- Power shortage crisis since the early 2000s is a major stumbling block in the development of industry and industrial estates.

EPZs (Export Processing Zones):

- An industrial area where export-oriented industries are set up.
- Products of these industries are mainly for export; if supplied to the local market, same price of goods as that for export.
- Examples: EPZ at Landhi, Karachi is the most successful; another being built at Gwadar; EPZ in Sambrial, Sialkot, Risalpur and Gujranwala.

Aims of Setting Up EPZs:

- Boosting industrial activity.
- Increasing export earnings.
- Attracting investors.
- Creating jobs.
- Transferring Hi-Tech from the developed countries like the US, Japan and the EU (European Union) countries.
- Other details in the chapter on "Trade"

Government Policies Towards Industrial Sector Since 1947:

- 1955: PIDC (Pakistan Industrial Development Corporation) to set up public sector industries.
- 1960's: Private sector was encouraged during Ayub's regime; various incentives were offered to investors.
- Self sufficiency in most of agro-based industries.
- 1970's process of nationalization by Z.A. Bhutto; several private sector industries were taken over by the government.
- Resulted in a slow pace of industrialization.
- Private investors felt discouraged.
- 1980s: denationalization by General Zia; nationalized units were returned to their owners.
- 1990s: privatization of SOE's (State Owned Enterprises) by the Sharif government; partial privatization of Pakistan Railways to improve its working.

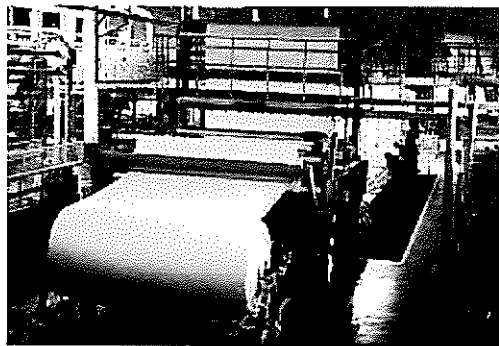
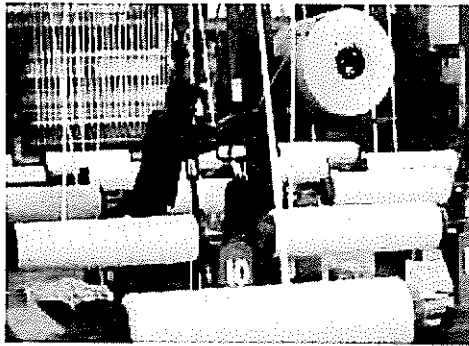
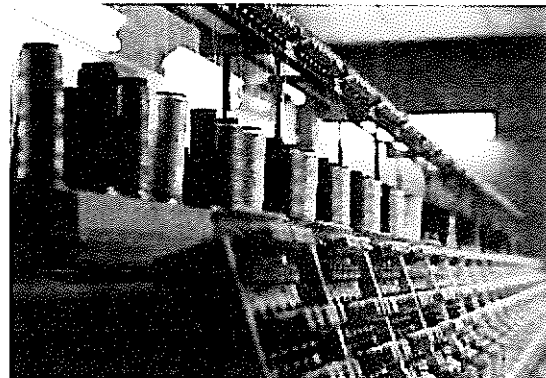
MAJOR FACTORY INDUSTRIES

I. Cotton textile:

- Widely distributed in several parts of Pakistan.
- Karachi, Faisalabad, Hyderabad, Lahore main centers.
- Raw materials: cotton and cotton yarn.
- Products/Output: cotton cloth and readymade garments: products exported in bulk; also used locally.

Processes:

- Ginning: separating lint from seeds.
- Spinning: making cotton yarn.
- Weaving: folding cotton yarn on a roller and pressing it to make cotton fabric.



Importance/Advantages:

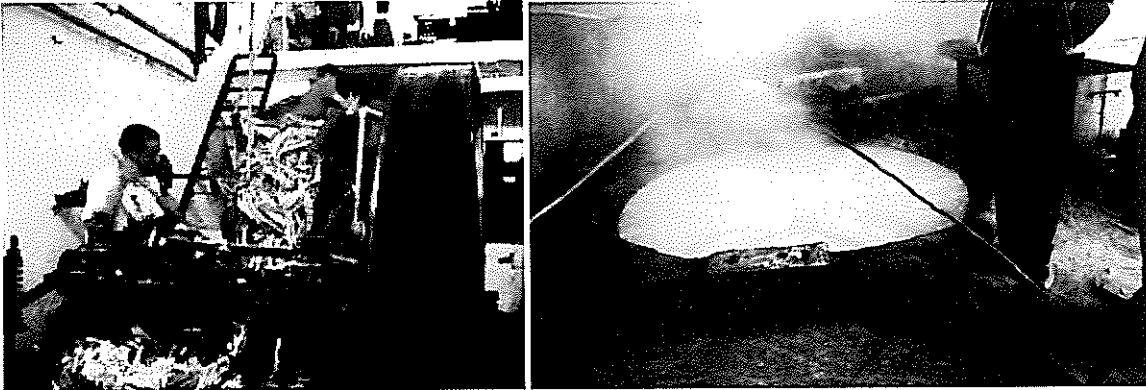
- Employs 50% of industrial labour.
- 60% of exports related to cotton.
- Contributes 11% to GDP.
- Cotton cultivation on large scale in Pakistan.

Problems/Disadvantages:

- Unpredictable shortage of raw material (raw cotton) due to curl leaf virus (CLV) floods, drought.
- Recession in the international market.
- Tough competition with China, Taiwan, Egypt and South Korea.
- Lack of modernization due to lack of finance.
- Acute shortage of power since 2007.
- Challenges resulting from the implementation of the WTO (World Trade Organization) since 2004.
- Neglect of other industries due to heavy dependence on cotton textile industry.

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II. Sugar industry:



- Distributed in Punjab, Sindh and KPK.
- None in Balochistan.
- Sugar mill should be closer to the sugar cane fields because:-
 1. sugar-cane starts losing weight after harvest,
 2. its bulky and heavy: expensive to transport,
 3. due to losing weight: quality and quantity of the sugar may deteriorate.

By-products:

- (a) Bagasse: fuel for boilers in sugar mills; to make chip boards, papers; used as livestock fodder.
- (b) Molasses: to manufacture various acids in the chemical industry.

III. CHEMICAL FERTILIZERS INDUSRTY

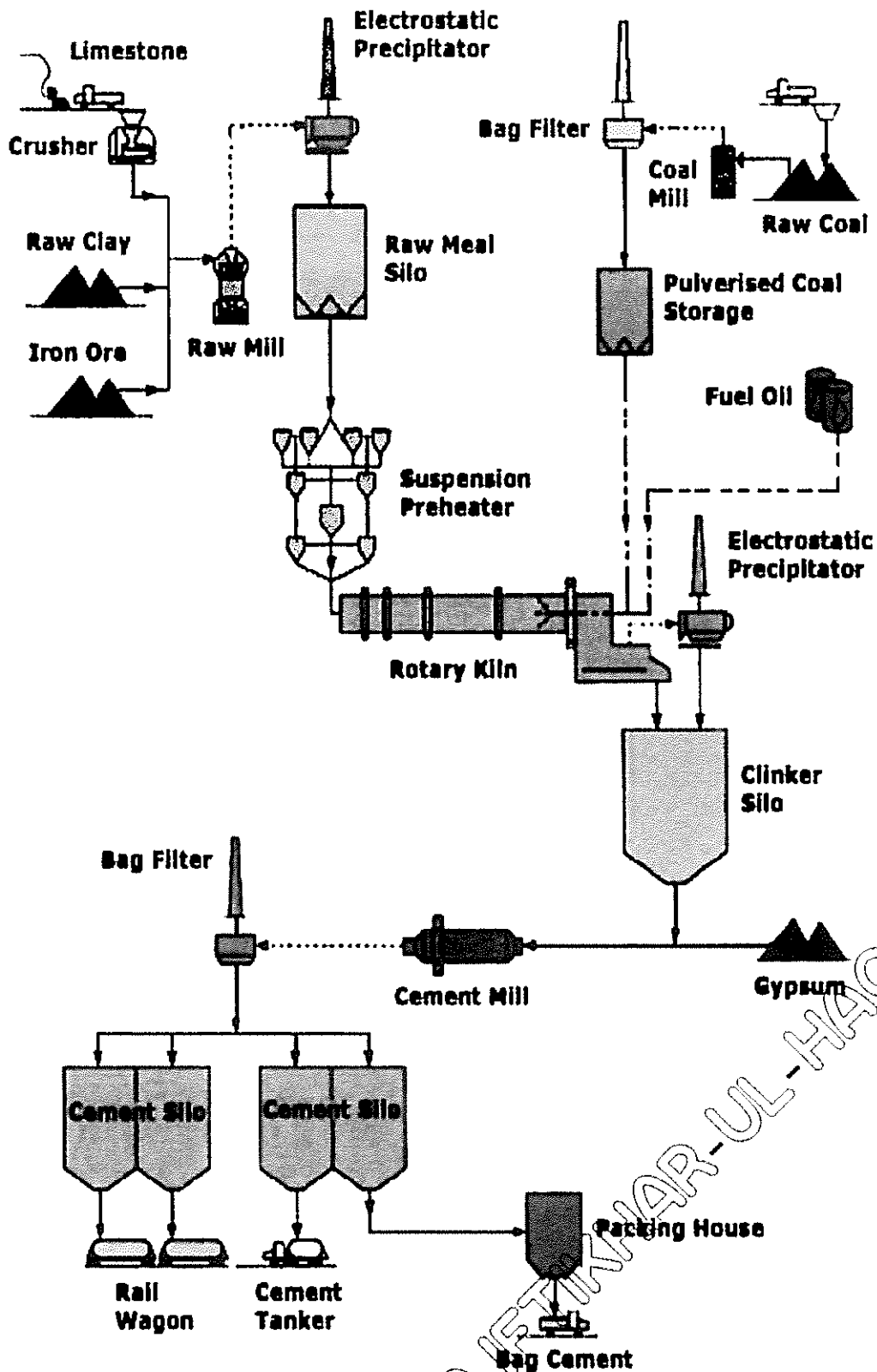
- High growth since the Green Revolution of the 1960s.
- Vital for Pakistan's agro-based economy; crop production on large scale needs fertile soils.

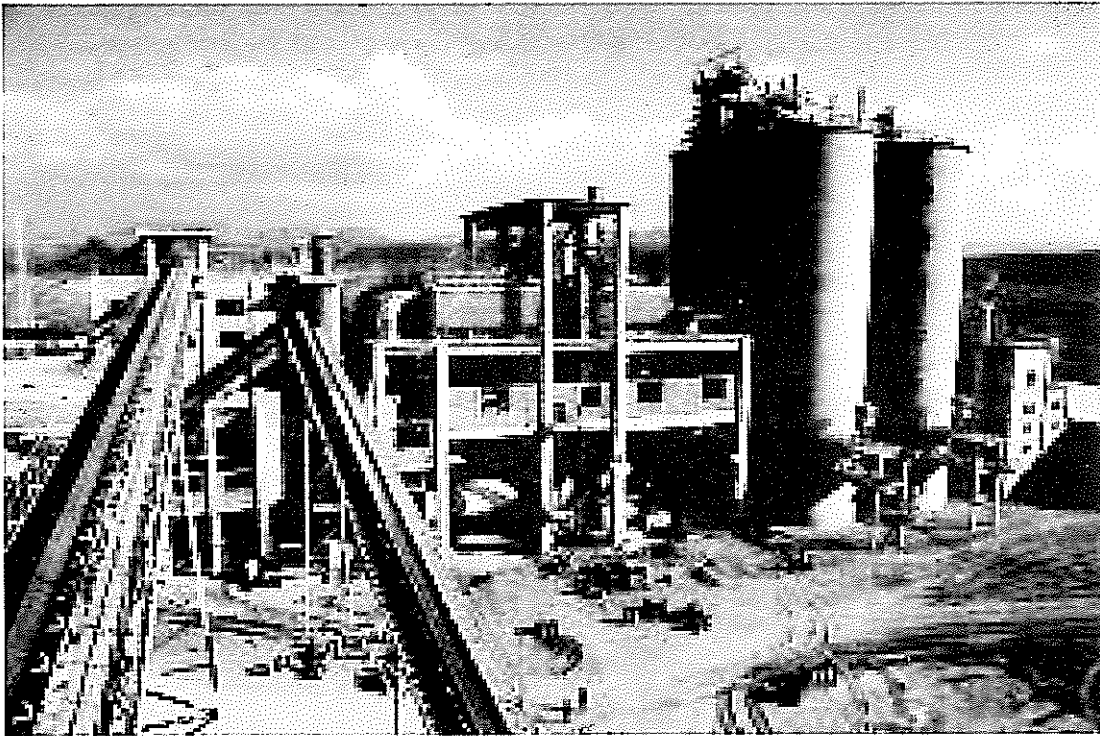
Raw materials:

- Sulphur, gypsum, phosphate and natural gas (now main raw material).
- Faisalabad, Daud Khel (Punjab), Haripur (KPK) and Dharki (Sindh) are main centers.
- 92% Nitrogenous fertilizers are manufactured due to a deficiency of organicity in Pakistani soils.

IV. CEMENT INDUSTRY

CEMENT PRODUCTION PROCESS





Importance and Reasons of Growth:

- Availability of limestone, gypsum
- Natural gas as cheap fuel
- Huge domestic and foreign market
- Lesser availability of wood for construction.

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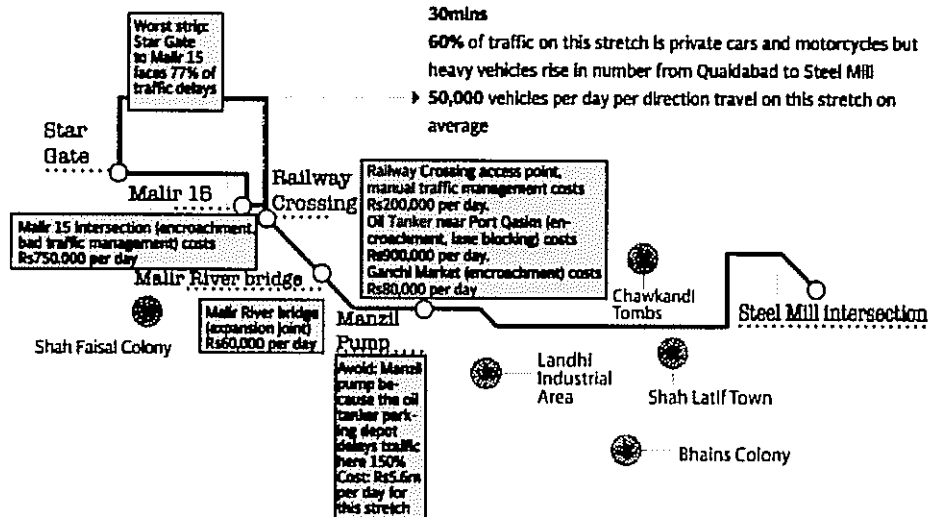
V. IRON AND STEEL INDUSTRY



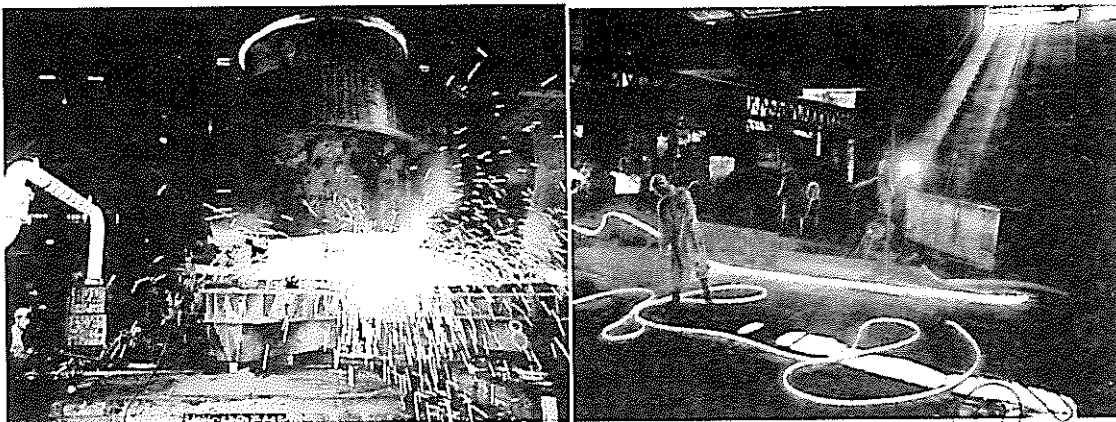
Star Gate to Pakistan Steel Mill Intersections

17mins is how long it should take to travel this stretch with no obstructions (free flow travel time) but it actually takes over 30mins

60% of traffic on this stretch is private cars and motorcycles but heavy vehicles rise in number from Quaidabad to Steel Mill
→ 50,000 vehicles per day per direction travel on this stretch on average



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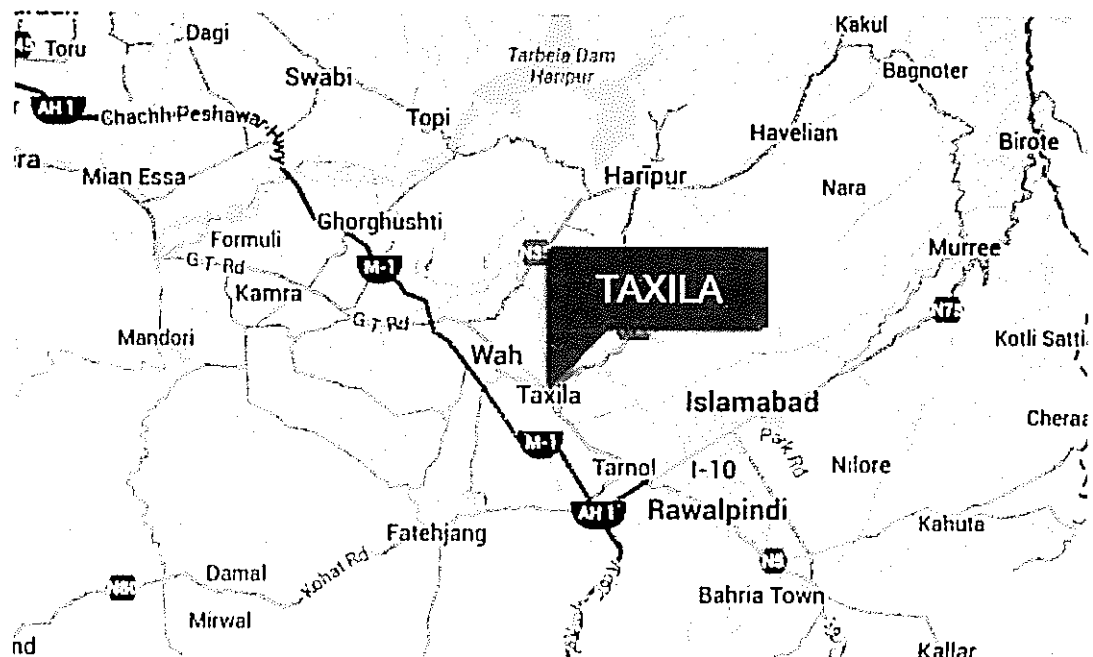
- 1st steel mill, PSM (Pakistan Steel Mill) set up in December 1973, 40km east of Karachi at Gharo creek, near port Qasim, with Soviet assistance location; Pipri
- Production: steel; raw material for construction and engineering industry e.g. coke, pig iron, files, billets and sheets.
- 2nd iron industry at Taxila: HMC (Heavy Mechanical Complex)
- Established in 1979, with the Chinese assistance.

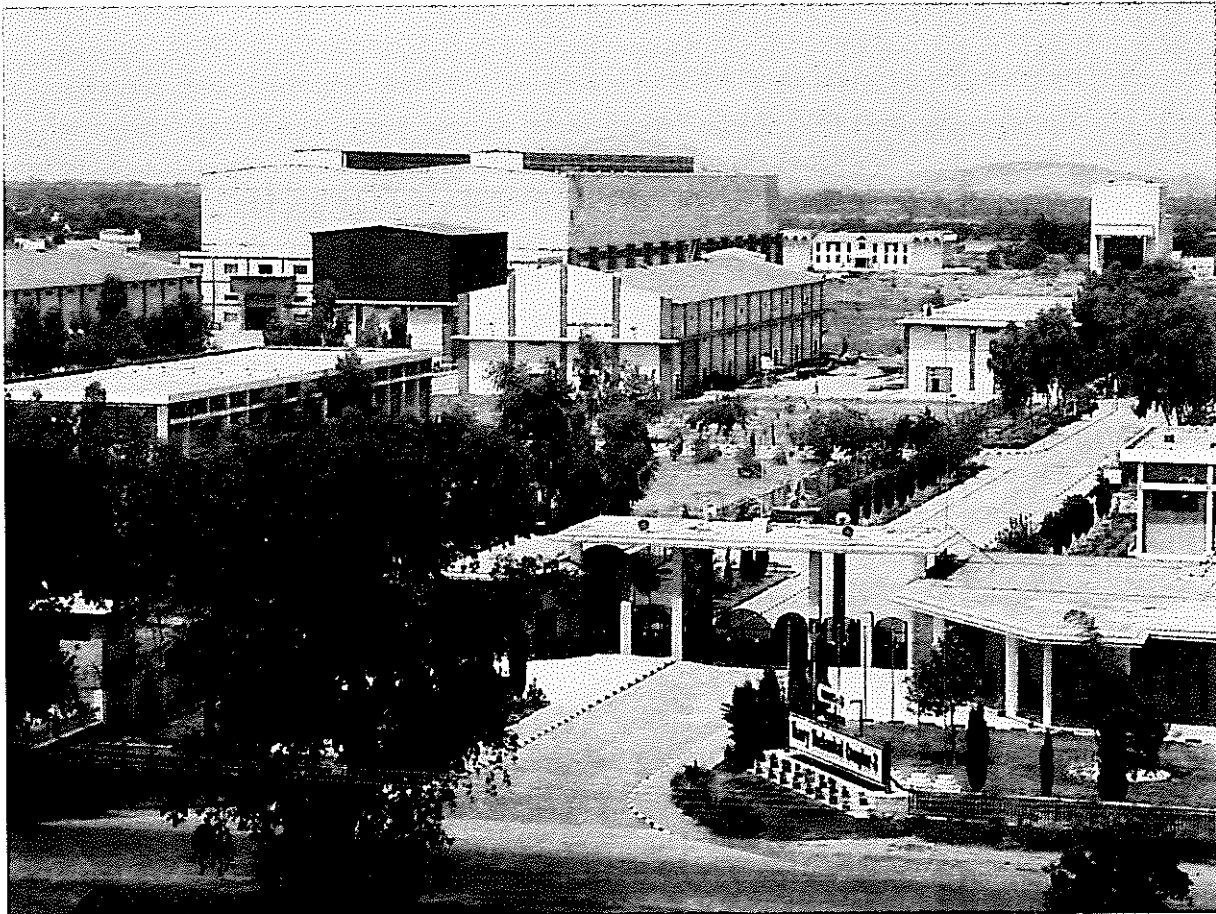
Products:

- Machinery for HEP plants, thermal plants; oil and gas processing plants, and chemical and petro-chemical plants.
- At HFF (Heavy Forge Factory): defence equipment is manufactured.

Factors for Location of Iron and Steel Industry:

1. PSM (Pakistan Steel Mill): flat and cheap land of Pipri near the coast; connected to the specially built Port Qasim; fresh water supply from Lake Haleji, cheap labour from Karachi, limestone from the Murali Hills, thermal and nuclear power, largest market of Karachi which is well connected to the rest of Pakistan by road and rail links; capital was provided by the USSR (now Russia).
2. HMC (Heavy Mechanical Complex), Taxila: flat land of the Potwar Plateau, limestone and iron ore deposits in the regions, hydroelectric power from Tarbela, cheap labour from the neighbouring cities, located between the GT Road and the main Peshawar-Karachi railway route, huge markets of Punjab and KPK around Taxila; capital supplied by China.
3. There are many iron and steel mills in major towns of Pakistan operating under the private sector, e.g., the Ittefaq Industries, Malik Steel and Mughal Steel in Lahore.





Advantages of Iron and Steel Industry:

- Source of large scale employment.
- Reduced import spendings as products are manufactured locally.
- Satisfies needs of many other industries, e.g., engineering industry and construction industry.
- Potential for exports if many industrial units are set up in various parts of Pakistan; more export earnings and an improved BOP (Balance of Payment).

Disadvantages/Problems:

- Power shortage crisis
- Huge area required; more deforestation.
- Huge investment needed; Pakistan has to seek foreign assistance.
- All types of pollution: air pollution due to release of heat and smoke, noise pollution by heavy machinery; land and water pollution by untreated waste.

Small Scale Industries:

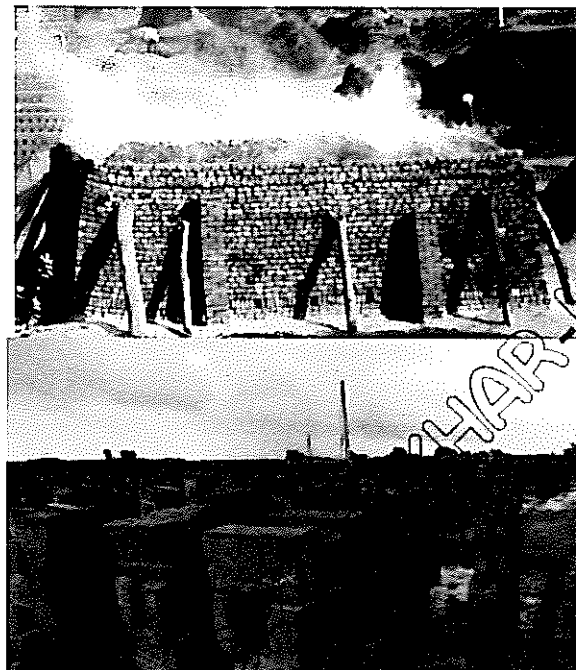
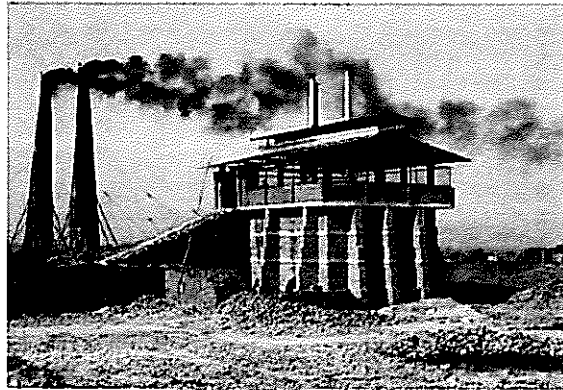
1. SPORTS GOODS AND SURGICAL INSTRUMENTS:

- Mainly made in Sialkot.
- Main small to medium industry.
- Export oriented.
- Easily available skilled labour and raw material (local and imported) e.g. wood, leather, rubber, thread.
- Formal and informal style e.g. stitching and cutting under primitive conditions.
- Yet meets international standards.

2. SURGICAL INSTRUMENTS:

- Mainly industries are in Sialkot and Lahore.
- Repair to manufacture of simple and advanced instruments.
- Local supply and export.
- Competition with some of the developing countries despite the issue of child labour.

3. Brick Kiln Industry



Location:

- Usually, outskirts of major and small cities.

Inputs:

- Clay, water, power, manual labour (in Pakistan, child labour and bonded labour are main source).

Processes:

- Mixing clay with water; using moulds to shape rectangular blocks; drying in sunlight; baking in fire to impart hardness to the soft mixture.

Output:

- Bricks of various sizes and thickness.

Uses:

- Main construction material; lining of canals; sewerage drains in rural areas; protecting underground electric, telephone cables and pipelines; making footpaths etc

Importance of Brick kiln industry:

- Source of employment to unskilled and skilled people; construction material on cheap rate; use of cheaply available raw materials.

Disadvantages:

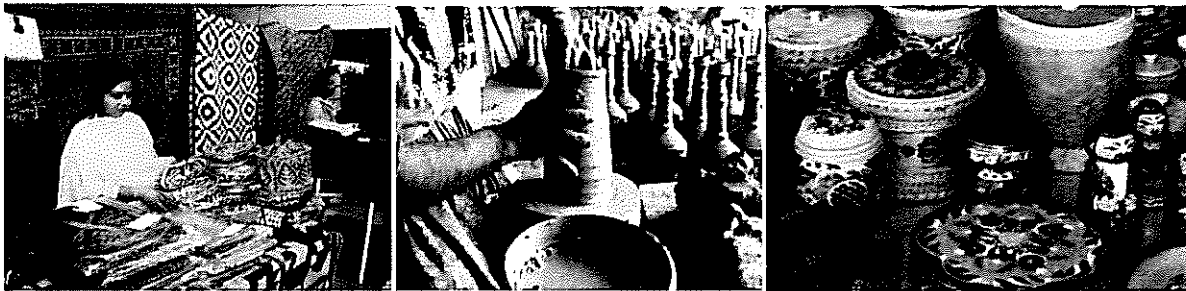
- Adverse effects on environment, causing air pollution through smoke from chimneys, heat, dust, toxic gases (oxides of carbon); consumption of coal as main power source (brick kilns are major users of coal); ill effects on kiln workers who work in unhygienic conditions (40 degree Celsius and above temperature, smoke and polluted air); workers are under-paid and over-worked and are poorly nourished, usually deprived of sufficient sleep.
- Workers may suffer from asthma, tuberculosis and other respiratory and skin disorders due to exposure to heat and pollutants released from burning coal, tyres and organic matter.
- Kilns, due to relying on old methods, contribute to global warming and environmental degradation.

Measure to Improve Brick Kilns:

- Enforcing environment protection laws; eliminating child and bonded labour; EPA(Environment Protection Agency) trying to replace coal with natural gas; safety devices being provided to workers, e.g., masks, adequate clothing, food etc.
- Fixing chimneys at greater height, replacing manual labour with automatic baking machines to reduce the time of baking and drying processes.
- Installing air filters, precipitators, and planting trees to reduce pollution.
- Adopting clean coal technology; giving loans to owners to improve working condition.

Small Scale Cottage and Craft Industry:

- Belongs to the informal sector.
- Home-based industry; family members provide labour; nominal electric power needed.
- Widely distributed throughout Pakistan.
- GB province specially known for this industry.
- Examples: embroidery products, straw products, wooden products, traditional footwear, e.g., Peshawari Chappal, earthenware/clay pots, ceramics, jewellery, printed fabric, e.g., Ajrak (a loose cloak of a single sheet of cloth) of Sindh and several other handicrafts.



FACTORS INFLUENCING ESTABLISHMENT OF COTTAGE AND SMALL-SCALE INDUSTRIES:

- Availability of raw material.
- Climatic conditions.
- Traditional skills.
- Local specialization in the organised factory sector.
- Local and foreign demand e.g. decline in the export of non-cotton products due to the concerns expressed by the West about the child labour, environmental pollution and poor health standards.

Importance/Advantages of Cottage and Craft Industry:

- Means of self-employment.
- No huge investment needed; less power consumption.
- No imported raw material; waste products of many local large scale industries are used as raw material.
- Source of women employment, thus discouraging child labour.
- Have potential to diversify exports and thus, increase Pakistan's export earnings.
- If supported by the government, they can improve living conditions of the rural communities and reduce disparity between rural and urban areas.

Problems/Disadvantages of Small Scale and Cottage Industry:

- Limited profits which are usually spent on the daily expenses.
- Use of primitive methods and machinery.
- Lack of standardization and quality control.
- Exploitation of owners by the middleman and whole-sale dealers; craftsmen and owners feel discouraged when they earn lesser profits.
- Without power in rural areas, it is very difficult to run and develop these industries; in cities load shedding and power breakdown adversely affect production and damage machinery.
- No institutional training; usually inherited skills.
- No economies of scale, high production cost, difficult to compete in the open market.

GOVERNMENT POLICY TOWARDS SMALL-SCALE INDUSTRIES:

- Various bodies to develop these industries:
- PSIC (Pakistan Small Industries Corporation) and provincial bodies e.g. PSIC (Punjab), SSIC (Sindh), SIDB (Small Industries Development Board) and DSIB (Directorate of Small Industries Balochistan)
- Establishment of TEVTA (Technical Education and Vocational Training Authority) to impart technical education.
- SMEDA (small and medium enterprises development authority).
- These bodies:
 - Provide technical and financial help
 - Provide marketing facilities.
 - Set up handicrafts and carpets development centres.
 - Set up technical service centres.

INDUSTRY AND ENVIRONMENT:

- Air and aquatic pollution by chemical units, brick kilns, factories and vehicular traffic cause respiratory disorders like throat infection, asthma, allergies and skin problems.
- Release of smoke and toxic gases worsen air pollution.
- Contamination of subsoil water causes digestive disorders when this water is consumed.
- Running of heavy machinery causes noise pollution.
- Land pollution is caused by dumping waste and burning it (e.g. plastic bags) this causes toxic smoke.
- Contamination of crops is caused by municipal and industrial waste water.
- Adverse impact on marine life by:
 - Disposal of industrial waste from the Korangi industrial area, Karachi.
 - High proportion of lead in marine life; when consumed by humans may cause anemia, kidney failure and damage to the nervous system.
 - Serious threat to growth of mangroves.
 - Contamination of sea water by pumped out bilges and refuse at the terminal; also, considerable pollution by the export industries located near the port due to the release of untreated effluents in the sea.

Measures to control industrial pollution:

- Efficient mechanism for disposal of effluents and waste onto ground or into drains and canals.
- Importing machinery to treat waste.
- Installing precipitators and catalytic convertors.
- Utilizing our own resources against pollution, planting trees on extensive scale to minimize pollution and poisonous effects.
- Enforcement of strict laws to discourage corrupt officials and multinationals from dumping untreated waste in the sea; also, industries should not be allowed in city limits.
- Creating awareness among people about the value of a clean environment.
- More measures like the passage of PEPA, (Pakistan Environmental Protection Act) and NEQS (National Environmental Quality Standards) to reduce effects of pollution.

Government Policies for Developing the Secondary Industry:

- No major development for industrial development from 1947 to 1960 except for Jinnah's industrial policy announcement in 1948, and establishment of the PIDC (Pakistan Industrial Development Corporation) in the 1950s.
- Ayub's industrial reforms boosted industrial growth in the 1960s.
- Z. A. Bhutto's nationalization of private sector industries resulted in a slow industrial growth rate in the 1970s.
- Zia's policy of denationalization caused an improved industrial growth, though this improved growth was accompanied by a start of power shortage crisis from 1985 onwards.
- Privatization of the SOE (State Owned Enterprises), 1988 onwards especially by the Sharif governments of 1990-1993 and 1997-1999.
- Objectives of privatization: expansion of the private sector for better performance; improving the quantity and quality of production; reducing burden on the government; ensuring more rapid industrialization.

Tertiary industry:

Tourism:

- Tourism is a whole business of providing accommodation and recreation to visitors who stay at or visit a place for a limited period of time.
- International visitors to Pakistan come here for business/political reasons, for visiting families or simply as tourists.
- For business:
 - Mainly from Europe and US.
 - Come to attend trade delegations or for educational purposes e.g. foreign students and teachers or also as staff of multinationals e.g. major banks, major restaurants etc. they may also come as the UN officials e.g. UNHCR, WHO (World Health Organization), WFP (World Food Program) as well as members of diplomatic teams.

- Those who are international visitors are mainly from the Middle East, US, EU (European Union), Canada and Australia; many expatriate Pakistanis come to visit their families; Indian Muslims have relatives in Pakistan.
- The number of foreign tourists declined recently due to a wave of terrorism in several parts of Pakistan including the mountainous areas; inadequate security and mismanagement of the tourist sites.
- Lack of interest shown by various governments to promote this industry.

MAIN SOURCES OF OVERSEAS VISITORS TO PAKISTAN:

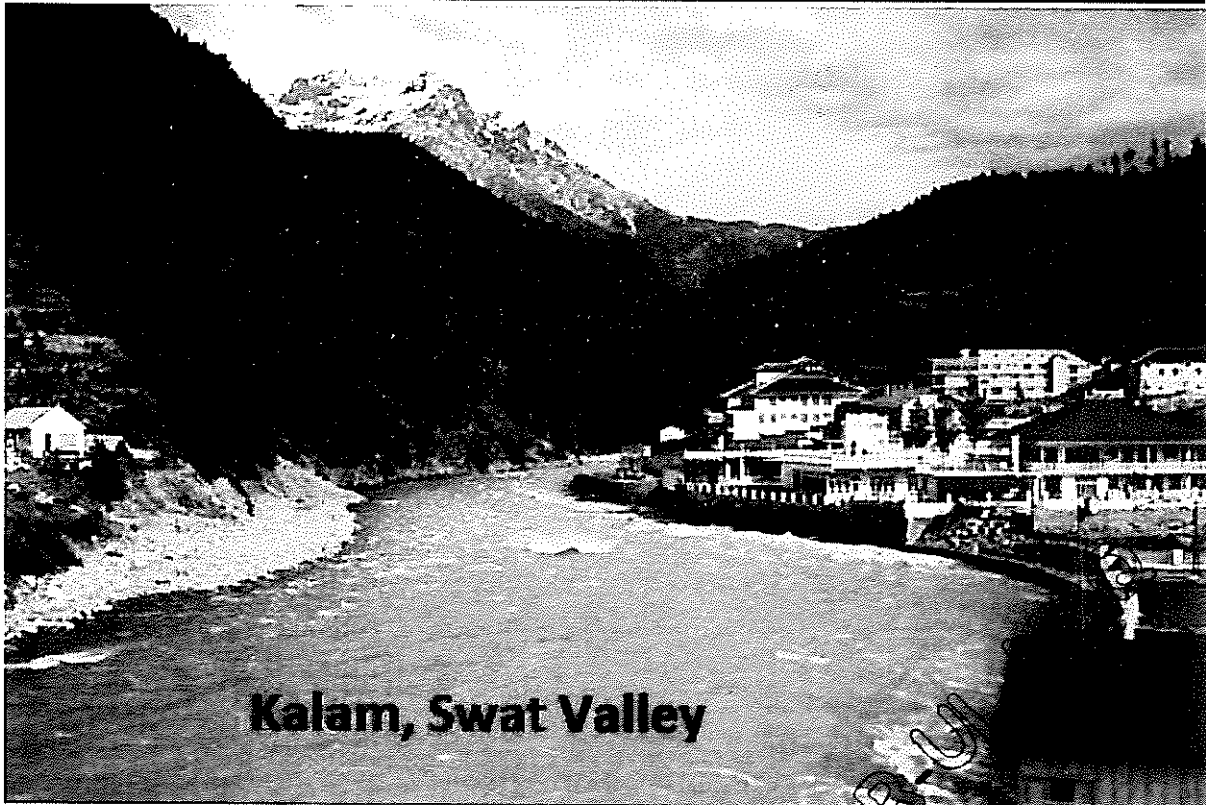
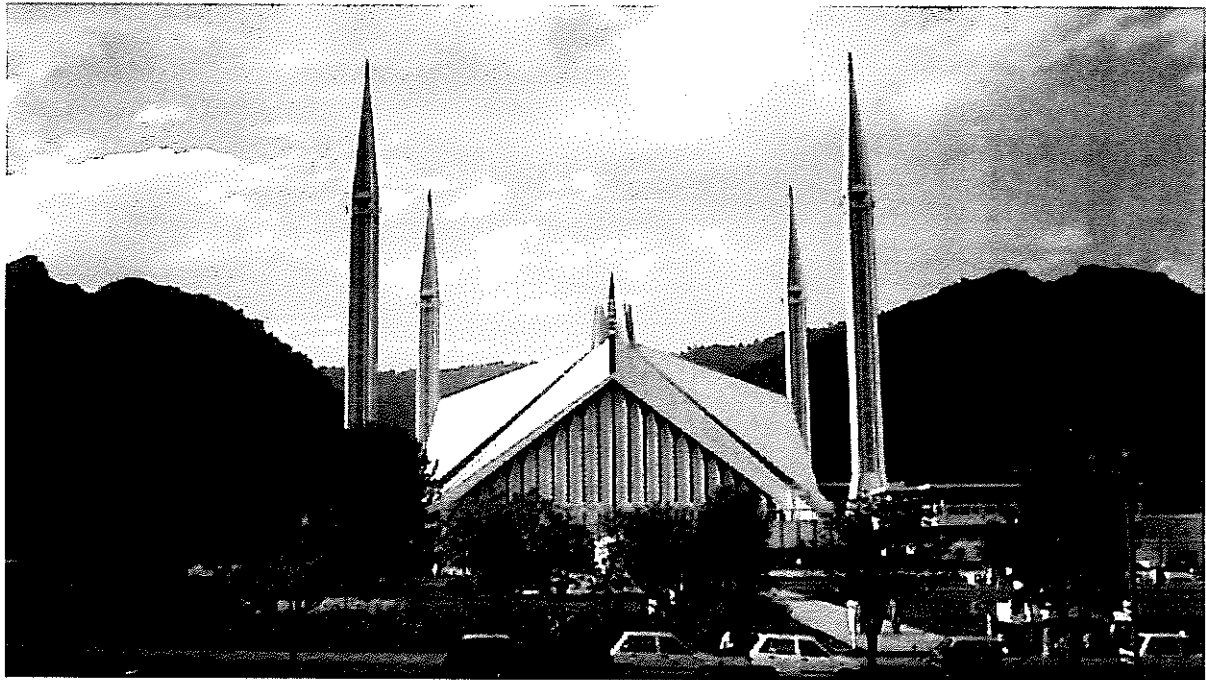
- UK and India mainly.
- Other: Germany, Japan, Russia, CAR's (Central Asian Republics), China, North America, Australia and the Middle East.

Tourists' attractions in Pakistan:

1. Scenic beauty of mountains and valleys:
 - Kaghan and many other valleys.
 - Shogran.
 - Fishing in the Kunhar River (brown trout is the main catch).
 - Naran and the lake Saiful Muluk.
 - Pastoral nomadic tribes.
 - Snow-capped peaks and vast green pastures.
 - Gilgit valley which is 1454m high.
 - Skardu which is the starting point for expeditions to K-2 and other high peaks.
 - Hunza valley due to the meadows, wheat fields and the snow-capped peaks.
 - Chitral along with the Kalash valley civilization and Shundur polo festival; world's highest polo ground is located there.
 - Murree and the Galiat. Murree is losing charm due to overcrowding and mismanagement; the Galiat, further higher, do attract tourists.

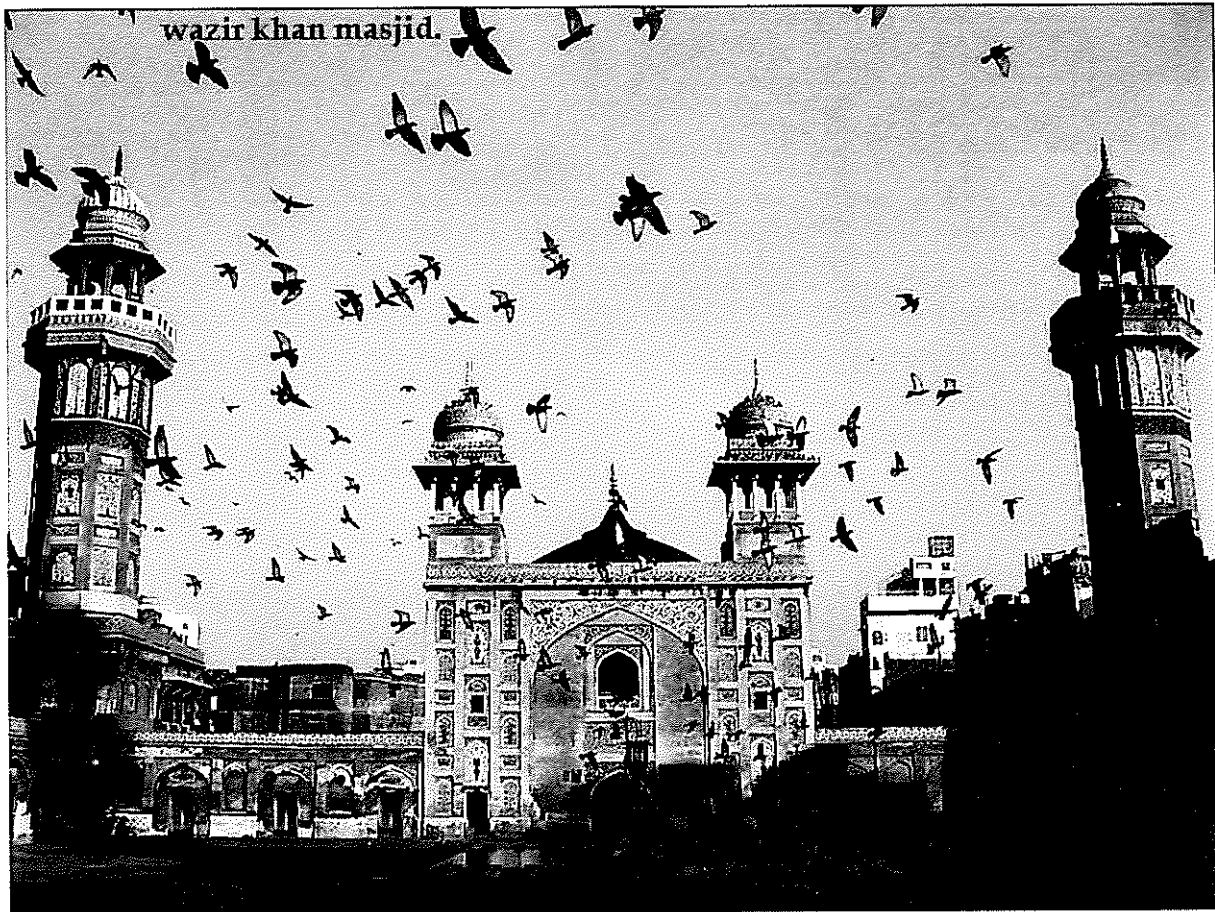
2. CULTURAL/HISTORICAL ATTRACTIONS:

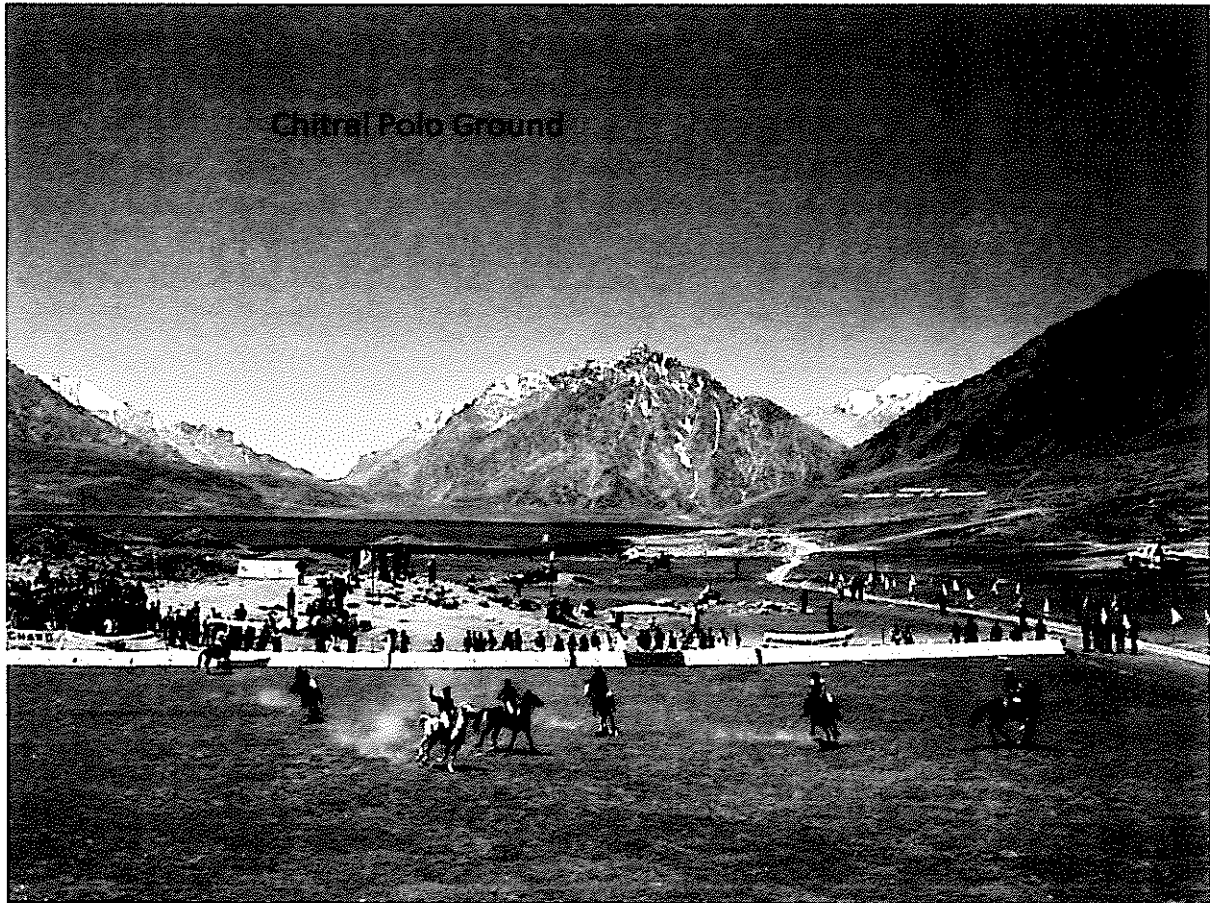
- Indus valley civilization of Moenjo Daro and Harappa; Gandhara civilization of Taxila to Peshawar.
- Historic sites e.g. forts, mosques (Badshahi Mosque, Lahore and Mahabat Khan Mosque, Peshawar), tombs of Jahangir, Noor Jehan, Allama Iqbal, Ranjit Singh etc.
- Shalamar Gardens in Lahore.
- Modern buildings like Faisal mosque, Meenari-Pakistan.
- Dams and barrages.
- Khewra salt mines and museums.



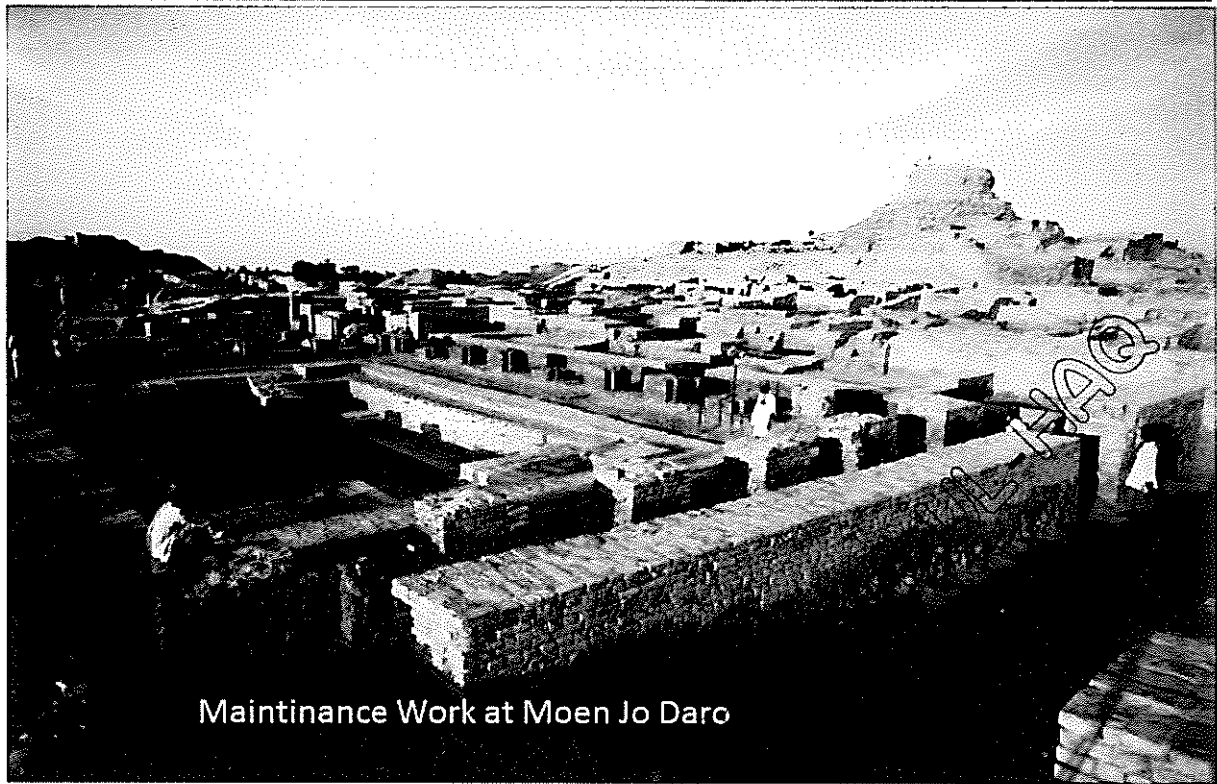
Kalam, Swat Valley

DR IFTIKHAR





Chitral Polo Ground



Maintenance Work at Moen Jo Daro

The Great Bath, Mohenjo-Daro



ADVANTAGES OF DEVELOPING TOURISM:

- Greater earning of foreign exchange as part of invisible exports, this improves BOP (Balance of Payment).
- Labour-intensive industry i.e. there are jobs for many people e.g. in hotels, resorts or as guides.
- Promotes cottage and craft industry.
- Increases production of food and other commodities.
- Local population can avail many of the tourist facilities.
- Reduces rural to urban migration as the income from tourism may be spent on local development.
- Cultural interaction between Pakistan and other countries.
- Sustainable industry: the tourist attractions, like mountains and valleys continue to remain there; they only need regular maintenance to preserve natural beauty.

Disadvantages:

- Capital required for tourism may be spent on other basic sectors: mining the power resources, developing the secondary industry.
- High adventure Tourism attracts healthy, young male adults (recently healthy young girls have also participated in hiking etc.); families cannot avail this type of tourism, and so, limited earning.
- Development and construction of buildings: locals lose homes and their old means of earning e.g. fishing etc. when building are constructed near rivers.
- Seasonal employment only: for most places in the northern mountains: May to October is the peak tourist season; landslides and heavy snowfalls restrict inflow of tourists.
- Adverse effect on local culture: frustration among locals may promote terrorism, drugs, prostitution, theft and other anti-social tendencies.
- Unaffordable facilities for domestic tourists as prices of daily commodities of life are unusually raised by the local traders.
- Local and global disturbances affect tourism: sharp decline after the 9/11 disturbances that have affected Pakistan significantly.

Factors Determining the Feasibility of Developing Tourism:

- Presence of tourist attractions.
- Adequate security for tourists.
- Availability of capital: to develop and maintain infrastructure of tourist sites: roads, transport, water and power supply, sewage disposal, hygienic food, health care points, emergency aid and creating added attractions like, cable cars and lift chairs.
- Transport and communication: better and reliable means of transport with metalled roads, arrangements against landslides, air transport especially helicopters can greatly enhance tourism.
- Management: mismanagement and neglect may adversely affect, e.g., Murree has become too congested a place to be enjoyed comfortably.
- Marketing and publicity: telecommunication may greatly help, e.g., websites of PTDC (Pakistan Tourism Development Corporation) though it was abolished in 2020; documentaries on TV; use of social media to highlight a better image of Pakistan.

- PATO (Pakistan Association of Tourism Operators) is advising the government to create an alternative body to PTDC
- Government Priorities: sustained and uniform government policies needed; the curse of terrorism should be eliminated on priority basis.
- A policy of 'targeted tourism' should be adopted: targeting those tourist points that can be developed with lesser cost, and are economically feasible.

Call Centres:

- A newly emerging tertiary industry.
- A Call Centre is the office of the organization that handles telephone calls to and from other companies.
- Calls are both inbound and outbound: an inbound call is from a customer to a company whereas an outbound call is made from the company to its customers.
- The Centre can handle a huge volume of calls at the same time with the help of the computer data system.
- Calls are filtered and forwarded to the qualified employees called Agents.
- Agents transfer calls to the relevant companies; this way it becomes cheaper for various companies to handle so many calls.
- Call Centres are also used by telemarketing and other companies that market their products through the telephone.

Call Centre Business in Pakistan:

- Government's decision to establish several Call Centres.
- A toll-free telephone number, 0800 provided by the government.
- Common services: airline booking, banking, hotels, reservations in advance, medical and insurance services, and data entries.
- Calls by domestic and overseas customers are routed to Call Centres in major towns like Karachi, Lahore and Islamabad; PTCL (Pakistan Telecommunication Company Limited) is facilitating connections for the Call Centres.
- This involves efficient and quick response to handle several calls simultaneously.

The Feasibility of Developing Call Centres in Pakistan:

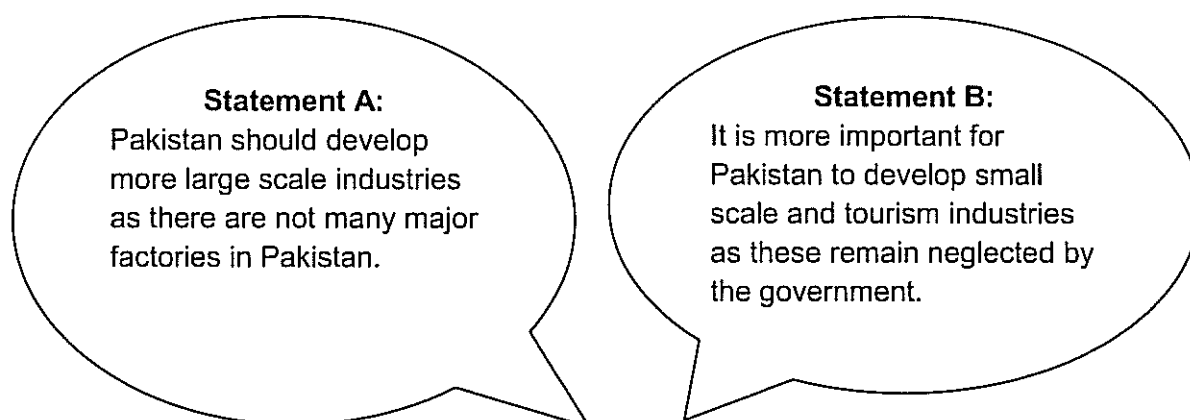
1. Helping Factors/Advantages:

- Huge growth potential due to a rapid growth of the services sector/tertiary industry.
- A popular source of revenue generation and creating jobs for the skilled people.
- Source of saving time, and promoting business through telemarketing.
- An effective means of division of labour in large companies.

2. Limiting Factors/Disadvantages:

- Mainly suitable for big urban centres; rural population of about 65% gets no benefit from this.
- Not suitable for the "computer-illiterate" and Unskilled people.
- Only a small number of computer operators needed at a Call Centre; no large scale employment.
- Slow pace of growth of business and industry in Pakistan has further restricted the popularity of Call Centres.

Sample Question of Two Statements



Q: Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

Large scale industries can boost Pakistan's exports and improve its negative BOP (Balance of Payment). They also create jobs on a large scale and provide revenue to the government. More iron and steel and similar industries can be set up with the help of foreign investment. It is possible to set up industrial estates along the Motorway, and EPZ's on the Gwadar Port. Such industries ensure a greater degree of value addition, and cut down Pakistan's heavy spendings on imports. On the other hand, small scale and cottage industries have limited output with lesser value addition. Lack of modernization and quality control further reduces their efficiency. Power shortage crisis is more serious in several areas where cottage industries are set up. Developing tourism industry is difficult due to the issues of terrorism and sectarian violence especially in the GB province and Balochistan. Consistent political instability have further deteriorated this industry. Thus the income generated from the large scale industries may be spent on developing small scale and tourism industries.

DR IFTIKHAR-UL-HAQ

Past Paper Question

“Tourism is an important and growing activity in Pakistan contributing 7.4 per cent to Gross Domestic Product in 2017.” To what extent is further development of Pakistan’s tourism industry possible? Give reasons to support your judgement. You should support different points of view in your answer. [6]

Ans.

Pakistan has a great potential to develop its tourism industry as 8 out of 20 highest peaks of the world are located in Pakistan. They include K-2, and other peaks in addition to one of the highest plateaus in the world, Deosai Plateau. In its extreme south it has a 1500 km long coastline where several tourist resorts and attractions can be built. So far Clifton, Hawke’s Bay and Sandspit on the Karachi coast are the only major tourist attractions. There are several historical sites of ancient civilizations that include Mohenjo-Daro and Harappa of the Indus valley civilization. Similarly, there are such Mughal monuments as Shalamar Gardens and Badshahi Mosque, Lahore. However, due to the lack of interest by the government, and political instability, have adversely affected the tourism industry. A serious power shortage crisis, and terrorism have further restricted the development of this industry. Despite this, Pakistan has more opportunities than challenges of expanding and maintaining tourism industry as it only needs a strong political will and aggressive advertisement campaign to attract tourist.

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CHAPTER 10

TRADE

Purposes/functions of trade:

- Links various activities, e.g., movement of goods for manufacturing, processing and sale; raw cotton, limestone, iron ore from mines to mills; sale of manufactured items e.g., cotton yarn, steel, cement.
- Helps specialization of regions in production of a variety of commodities, and exchange of goods between different regions.
- Provides jobs in the tertiary industry, e.g., transport, computer operators.

Benefits/Importance of trade:

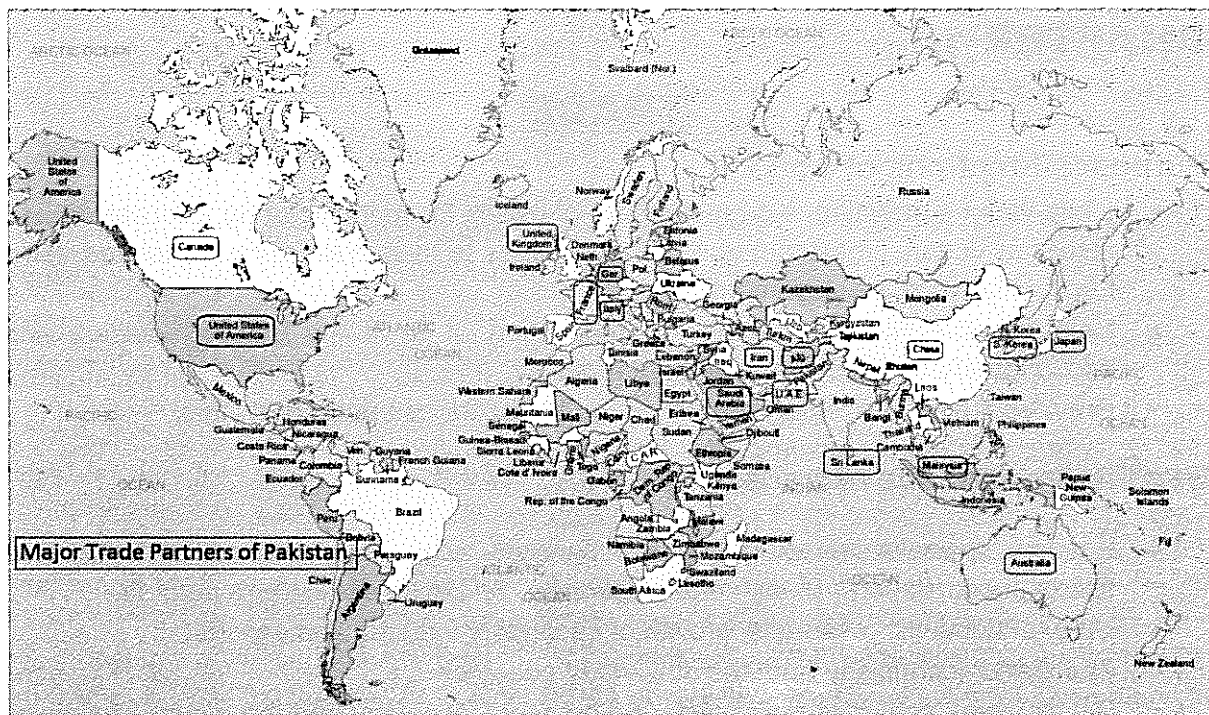
- Ensures specialization of goods and services, e.g., Pakistan's cotton textile and sports goods, Japan's hi-tech and electronics, Sri Lanka's tea, Iran's carpets.
- Utility of domestic resources, growth of secondary industry and exports.
- Transfer of technology from the developed countries
- Development schemes may be started by new technology and the foreign exchange earnings.
- Growth of value-added products in the under-developed countries in order to increase earnings, e.g., canned fish, ready-made garments etc.
- Achieving economies of scale as a result of large scale production resulting from an increase in demand of products by the trading partners.
- Improved relations between states, e.g., Pak-India hostility may be reduced by promoting bilateral trade.
- Foreign exchange earnings have multiple benefits: source of increasing national income, exports; start of development schemes: creation of jobs; promotion of domestic trade.

MAJOR IMPORTS

- Capital goods e.g. machinery, electrical and electronic appliances mainly from UK, Eastern Europe, USA and Japan; more recently from South Korea and Malaysia.
- Vegetable oil, wheat from the USA.
- Edible oil/palm oil from Malaysia.
- Crude oil from the Middle East, mainly Saudi Arabia and Iran.
- Tea and coffee from Sri Lanka and Kenya.
- Medicines from UK, Germany and the USA.

MAJOR EXPORTS

- Raw cotton mainly to UK.
- Cotton cloth mainly to Eastern Europe and the Middle East; cotton yarn to China including Hong Kong.
- Carpets, rugs, surgical instruments, sports goods to the USA and the Middle East.
- Ready-made garments, rice and spices to the Middle East.
- Fish and fish products to Japan, some of the EU states and Sri Lanka.



main trading partner	goods imported from	goods exported to
UK	iron and steel machinery electrical appliances vehicles	clothing/textiles cereals/fruits/nuts cotton surgical goods
Germany/ named EU countries	machinery pharmaceuticals electrical appliances chemicals	clothing/textiles cotton leather articles surgical goods
USA	cotton iron and steel machinery pharmaceuticals mineral oil/fuel vegetable oil wheat	clothing/textiles cotton leather articles carpets/rugs surgical goods sports goods
named Middle Eastern countries	mineral oil/fuel electrical equipment plastics machinery	meat cereals clothing/textiles spices/rice
China	electrical equipment machinery pharmaceuticals mineral oil/fuel stationary	cotton copper cereals fish cotton yarn
Afghanistan	cotton fruits/nuts/vegetable mineral oils/fuel salt iron and steel plastics	cereals/sugar/flour/rice/ vegetables edible oil salt pharmaceuticals
Japan	electrical appliances vehicles machinery	cotton clothing/textiles fish and fish products
Bangladesh	tea cotton/jute	cement textiles
Indonesia/ Malaysia/Sri Lanka	tea edible oil	textiles clothing

Trade Routes and Factors Affecting Pakistan's Trade with Other Countries:

- In the east, India; no major trade due to disturbed Pakistan-India relations, though there are easy road and rail routes on flat land facilitating an efficient transportation of goods.
- In the north-west, Afghanistan: highly rugged terrain with narrow and winding roads and high and narrow passes, e.g., Khyber, Khojak, Kurram; usually disturbed relations hinder trade with Afghanistan; if relations are improved, indirect access to Central Asia; these are rich in oil and gas reserves that can be imported by Pakistan through pipelines.
- Some recent improvements, e.g., Quetta-Chaman road and the proposed gas pipeline from Tajikistan to Pakistan.
- In the north, China: the Silk Route and its remodeled version, the KKH (Karakoram Highway) is the major source of trade with China; highly dangerous road but regularly maintained by China and Pakistan.
- Ultimate aim: to link Karachi port with Central Asia through China; Gwadar Port to China as part of the CPEC (China-Pakistan Economic Corridor), 2015-16 project.
- In the south-west, Iran: the RCD Highway and railway route to Iran and Turkey since 1964, but after the Iranian revolution of 1980 these routes not being fully utilized; in 2016, an important agreement between India and Iran to build the Chahbahar Port; if developed it will restrict efficiency of the Gwadar Port.
- In the south, Arabian Sea: warm water ports on the Pakistan coast remain open throughout the year; modern facilities at Karachi and Bin Qasim ports to ensure easy access to the Middle East; short cut to Europe through the Red Sea-Suez Canal-Mediterranean Sea; also route towards north Africa, South East Asia and Japan; Gwadar Port will further boost trade through the Arabian Sea.

GDP and GNP:

GDP (Grand Domestic Product):

- A measure of national income/national or domestic output.
- Represents the monetary value of all goods and services produced within a nation's geographic borders over a specific period of time.
- Usually calculated on an annual basis.

GNP (Gross National Product):

- A broad measure of a nation's total economic activity.
- Value of all finished goods and services produced in a country in one year by its nationals.
- Includes income of the citizens working in the country and the investment of the overseas residents.

Growth and Composition of Imports and Exports Since 1947:

Imports:

- Steady growth, in general between 1947-48 and 1971-72.
- Rapid growth of imports since 1972; devaluation of currency; rise in oil prices; cost of imports increased.

- Early years: heavy import of consumer and capital goods due to lack of industrialization.
- 1960s: rapid industrial growth; more import of raw materials for capital and consumer goods.
- Recently: mainly raw materials imported; some capital and consumer goods.
- Early years after 1947: self-sufficient in food crops; later, due to population growth, import of food grains, edible oil and milk increased.

Exports:

- Slow growth, with fluctuation in exports; greater export of low value goods, agricultural products and raw materials; gradually more export of value-added goods instead of raw materials.
- Increase in exports mainly due to increased prices, not in terms of bulk of exports.
- 1985 onwards, significant growth in exports as a result of setting up of several industries and assemblage plants of electronic goods and automobile vehicles.

Reasons for the change in Composition of Imports and Exports:

- Gradually increase in the export of diversified goods.
- Exploration of new markets.
- Better quality of products.
- A variety of incentives offered to the exporters since the 1960s.
- Greater pace of industrialization 1960 onwards.
- Setting up of oil refineries and iron and steel industries.

Currency Exchange Rates:

- International trade mainly in superior currencies, e.g., dollar, pound and euro.
- Pakistani rupee has been experiencing depreciation against all these currencies over the decades.
- If Pakistani rupee is appreciated against these currencies, there will be lesser import cost but the export earnings will also decline as Pakistan will be paid lesser amount of foreign currencies.
- If rupee is depreciated, import cost will increase, but export earnings will increase.
- If Pakistan improves its BOP to make it positive then an appreciated rupee will benefit its economy as its import spending will be reduced and it may produce better quality goods to increase the bulk of its export.

BOT (Balance of Trade):

- It is the difference of value of exported goods and value of imported goods.
- A better indicator of foreign trade is BOP.

BOP (Balance of Payment):

- BOP is an indicator of a country's performance in foreign trade.
- BOP (Balance of Payments) is defined as the difference between the value of all exports (goods and services) and value of all imports (goods and services)
- Pakistan has almost always experienced a negative BOP.

Major Reasons for a Negative BOP of Pakistan:

Mainly, more spending on imports and lesser earnings from exports.

A. Heavy spending on import of:

- Capital goods and raw materials for capital and consumer goods, e.g., iron ore, manganese, coke for PSM, Karachi; machinery, machine parts, electrical appliances, crude oil, vegetable oil.
- Consumer goods are those that are directly purchased and used by the consumer, e.g., electronics, medicines, tea, automobile vehicles.
- Capital goods are used to make other goods, e.g., consumer goods.
- Non-essential/luxury consumer items, e.g., expensive garments, cosmetics (perfumes etc.) and automobile vehicles.
- Agricultural and food items despite the fact that Pakistan is an agro-based economy; these include: wheat, sugar, pulses, oilseeds etc.
- Services of foreign consultants for major projects, e.g., dams and other development schemes; they are paid huge sums of money.

B. Lesser Earnings Due to:

- Poor quality products; tough competition with such competitors as China, Malaysia, South Korea, India etc.
- Non-diversified exports; heavy dependence on export of select items, e.g., cotton textile, rice, leather products, sports goods (more than 60% of total export earnings are cotton-related)
- Trade barriers restrict exports for various reasons: pollution, child labour and poor work environment; boycott of sports goods in the mid 1990s due to the issue of child labour; some countries stopped import of fish from Pakistan due to serious concerns about the sea water pollution in Pakistan; trade relations with many countries were damaged after Pakistan became a nuclear state in 1998.
- Limited range of value-added products; mainly ready-made garments; difficult to increase export earnings without value-addition.
- Not many trade partners; Pakistan has export and import relations with almost the same countries; no major breakthrough in finding new and more profitable markets, e.g., CAR's (Central Asian Republics).

C. Miscellaneous Factors:

- Rising prices of oil in the world market adversely affect Pakistan's industries, e.g., sudden rise in oil prices in the 1970s and 1980s.
- Pakistan is not a member of any major trade bloc, e.g., ASEAN (Association of South East Asian Nations) or the EU (European Union); the ECO (Economic Cooperation Organization, evolved from the RCD) not efficient due to the disturbed relations with Afghanistan; SAARC (South Asian Association for Regional Cooperation) also ineffective mainly due to Pak-India disturbed relations; no success in making SAFTA (South Asian Free Trade Association) for the same reason.
- Many countries stopped aid to Pakistan after it conducted nuclear explosion in May 1998 and this further worsened the negative BOP.
- Failure to follow sustained development schemes, industrial and trade policies.

- Heavy spending on defence due to Indian hostility; repaying the debts is also a source of huge spendings.

Effects of a Negative BOP:

- Development projects have to be curtailed
- More reliance on foreign assistance
- More loans are taken to repay the previous debt
- Country's assets to be sold to pay off loans.
- High taxation leads to inflation that in turn causes a low purchasing power of consumers; as a result, there is a lower demand and lesser production.
- Serious consequences including trade embargo if Pakistan becomes a defaulter.

MEASURES TO IMPROVE BOP:

By increasing exports and restricting imports.

Increase exports:

- Exporting more value-added goods.
- Expanding the cottage and small industries to diversify exports.
- Increasing export of non-cotton products.
- Improving the quality of products in order to compete with other countries.
- Reducing taxes on exports and necessary imports.
- Creating and improving the performance of special bodies e.g. TDAP (Trade Development Authority of Pakistan) and EPZA (Export Processing Zones Authority) that sets up EPZs (Export Processing Zones); setting up more Expo Centres as those in Karachi and Lahore; setting up more dry ports to facilitate exports and imports of traders of inland/landlocked cities like Lahore, Faisalabad and Peshawar.
- A dry port provides most of the port facilities such as packaging and storing of goods and documentation and customs clearance services to save the time of traders.
- Examples: Mughalpura Dry Port, Lahore and dry ports in Peshawar, Quetta, Faisalabad and Multan.



Export Processing Zone Karachi

EPZs:

- These are areas reserved for export-oriented industries.
- Aims of EPZs: to increase industrialization and exports; create jobs and transfer Hi-Tech from the developed world; attract investors.

Infrastructure for the EPZs:

- Should be near the port to facilitate exports and imports, e.g., Karachi and Gwadar.
- Efficient transport and travel facilities: land and air transport for traders; land transport for the movement of workers, raw material and products.
- Consistent government policies to ensure a stable environment for trade and industry.
- Examples: Karachi, Sambrial (Sialkot), Risalpur and now, at Gwadar.

Potential and Scope of EPZs on the Makran Coast:

- Strategic location of Gwadar, near the UAE; proposed access to CAS (Central Asian States) through the Motorway and the CPEC (China-Pakistan Economic Corridor) started in 2015-16.
- Foreign investors with Hi-Tech can be attracted.
- Huge area to develop a deep sea port and EPZs.
- Infrastructure being developed, e.g., the Makran Coastal Highway that has reduced distance between Gwadar and Karachi by several hundred km; water from the Dasht River and Mirani Dam; power by a plant set up by WAPDA at Pasni, and proposed installation of a desalination plant (to purify sea-water).

TDAP (Trade Development Authority of Pakistan):

- Replaced the EPB (Export Promotion Bureau) to play an effective role because EPB was not able to play effective role in international trade.
- TDAP expected to give major improvements.
- Responsible for overall planning and development of all sectors of production and economy.
- Will be holding trade fairs and festivals in collaboration with the FPCCI (Federation of Pakistan's Chambers of Commerce and Industry) to display Pakistani products to the world; will also facilitate Pakistani traders to attend the same held abroad, e.g., Doha (Qatar) and Dubai (where a huge event Expo-20 was scheduled but cancelled due to the pandemic of Covid-19).

Restricting Imports:

- Restricting imports of consumer goods that are 12% of total imports; mostly luxury goods/non-essential.
- Exploiting local human resource potential instead of hiring foreign consultants for mega projects.
- Imposing heavy import duty on the import of those products which are manufactured locally.
- Overcoming the power shortage crisis to increase production of export goods.
- Explore industrial raw material locally.

Trade Barriers:

- Imposed by the government to restrict imports/exports.
- To restrict imports: increased tariffs (taxes on imports), trade embargo (ban on selected import products) and quotas (fixing an amount/limit of the imported goods).
- Protectionism: imposing trade barriers in order to 'protect domestic industry', e.g., easy flow of cheap goods from China, India etc may threaten domestic industry and so, trade barriers for protectionism.

Advantages of Trade Barriers:

- Greater self-reliance, growth of domestic industry due to protectionism.
- More jobs due to growth of domestic industry.
- Lesser dependence on imports, greater export earnings.
- Improved BOP.
- Lesser borrowing due to greater earnings.

Disadvantages:

- Complacency/lack of competitive spirit of domestic manufacturers due to declining competition.
- Limited choice for domestic consumers due to a lesser variety available.
- Local manufacturers might be forced to continue to produce low quality goods with higher costs of production.
- Possibility of political favoritism and bribing; government might act in a biased way while erecting trade barriers against some countries while sparing others.

WTO (World Trade Organization):

- Pak joined, December 2004.
- Membership of WTO will bring fewer opportunities and several challenges for Pakistan.
- Opportunities: mainly for services sector that will have to make few adjustments.
- Challenges: for industry, agriculture and public sector departments
- Cotton textile: will have to improve quality, modernize production and more value-addition will be needed.
- Medium and small scale industry: tough competition in quality with other countries.
- Agriculture: modernization and reduction in subsidies needed.
- Import duties on several goods to be reduced/regulated in line with the WTO regulations; this will adversely affect domestic industry.
- Public administration: strict measures to ensure transparent and cost-effective projects.
- Business environment to be in conformity to the WTO regulations.

How to Cope with the Challenges:

- Modernization of production process by training and education along modern lines.
- Building up a strong infrastructure, improving human resources and research in agriculture.
- Reforming the corrupt and inefficient civil services to operate under new rules.
- Measures to bring industry at par with international quality standards.

Pakistan and Its Trade with the EU (European Union):

- EU, a group of 27 European states merged as a single trading bloc in 1993.
- A new common currency Euro, though all member states also retained their own currencies.
- Purpose: to improve social, economic and political relations between the member states.

- Free trade economy: within the EU the goods and services are free from custom duties and import quotas.
- Important for Pakistan to trade with the EU, though with some disadvantages.

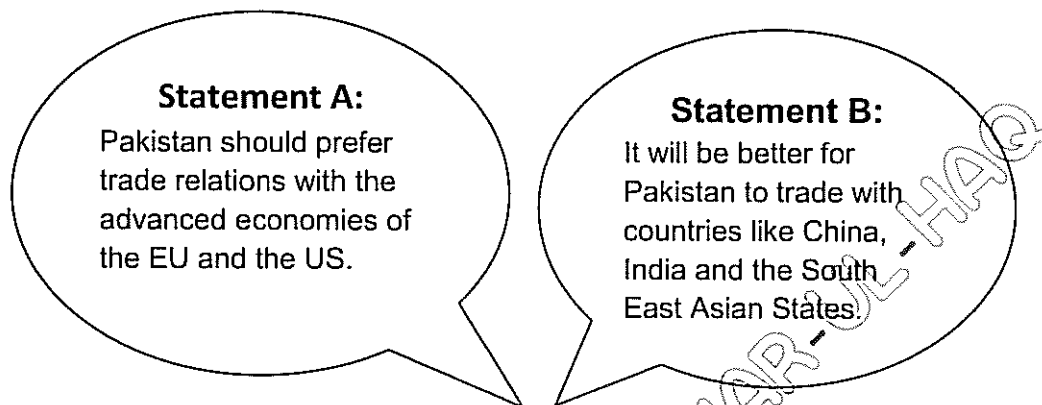
Advantages:

- More exports and more earning.
- Development of the export-oriented industries that will promote industrialization.
- More investment in industry by local and foreign investors.
- More jobs.
- Fewer trade barriers in the EU; easy to trade.
- EU politically stable and economically strong, so, less uncertainty in trade.

Disadvantages:

- Chances of sanctions due to terrorism, insecurity, child labour and poor working conditions.
- More pressure for improving the quality of goods to compete with other countries.
- Small scale and cottage industry products have poor quality; they may not be popular in the EU.
- Power shortage crisis in Pakistan; poor quality of production and failure to meet the deadline for exports.
- Trade agreements with other countries may damage relations with the EU states; if Pakistan imports poor quality goods at cheaper rates from China, imports from the EU will decline.
- Mainly agro-based exports of Pakistan; decline in agricultural output due to floods and pests may decrease industrial output and exports to the EU.
- Political uncertainty in Pakistan is a constant disturbing factor for trade with the EU.

Sample Question of Two Statements



Q: Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

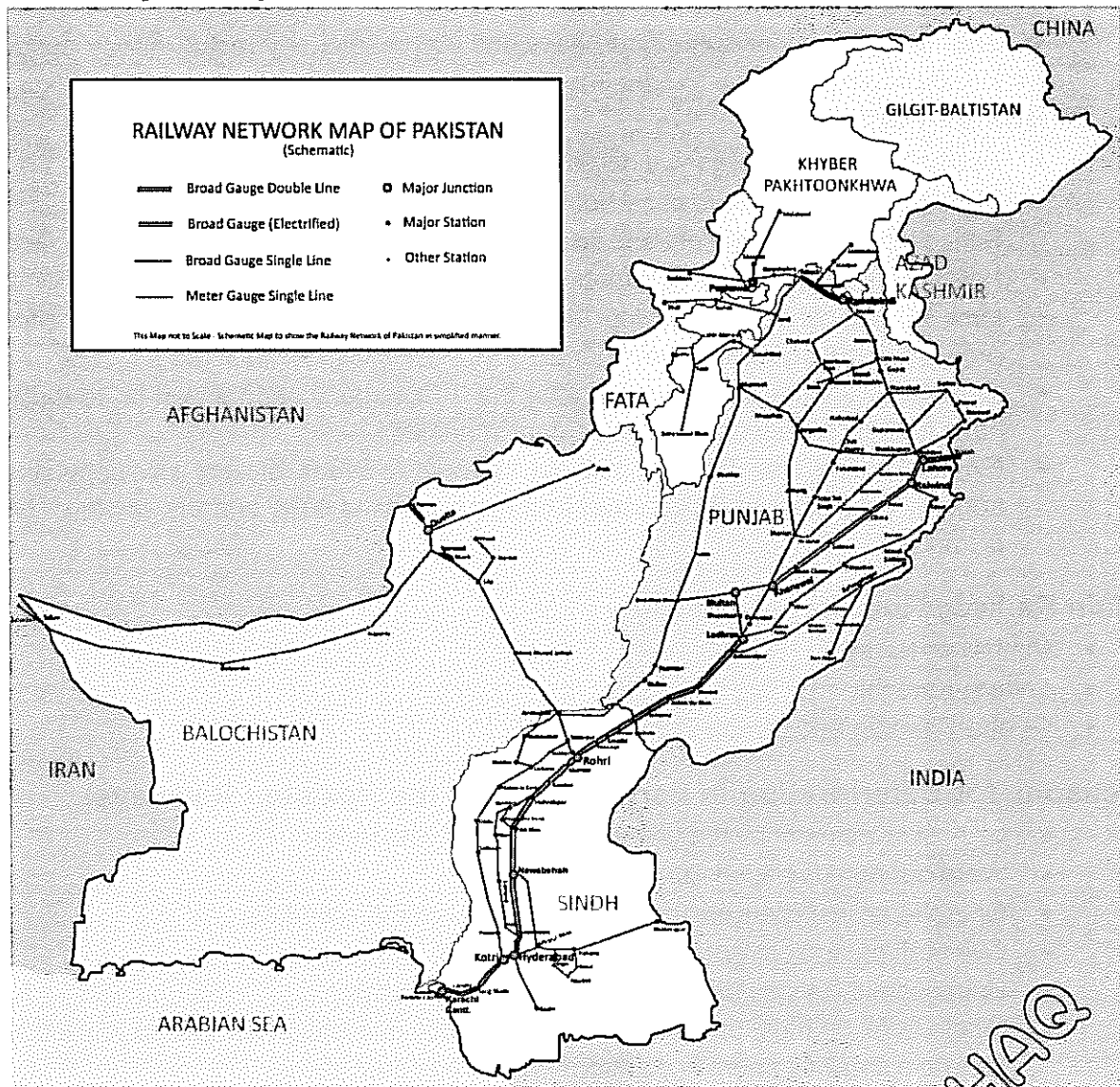
Advanced economies of the West have superior quality products with a huge variety that will satisfy Pakistan's needs. However, the issue of air and water pollution, poor quality of production and child labour are major hindrances in trade relations with these advanced countries. Greater geographical distance increases the transport cost of imports and exports. Therefore, there are greater benefits of trading with the neighbouring and South East Asian Countries as Pakistan will import good quality products and raw material from these states at lower prices. Pakistan will also learn how to ensure a sustained economic growth from these states, especially from China, Malaysia and South Korea. Trade with India is likely to improve the political relations if the SAARC (South Asian Association for Regional Cooperation) is made more effective by collective efforts of its member states. Pak-China relations have already led to several development projects in Pakistan, like the Gwadar Port Project and the CPEC (China Pakistan Economic Corridor). Thus Pakistan, together with China and South Asian States may form a huge trading bloc with minimum trade barriers.

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CHAPTER 11

TRANSPORT AND COMMUNICATION

1. Railway Transport:



Distribution of Network of Pakistan Railways:

- Total length 11900 km; Karachi to Peshawar.
- Mostly distributed in Punjab and Sindh along the rivers to develop in flat areas.
- Also in the valleys of KPK: Peshawar, Kohat, Bannu.
- A route from Peshawar to Torkham (near Pak-Afghan border) via Khyber Pass.
- Another from Nowshera to Dargai (last station in the Western Mountains).
- A branch from Sukkur-Sibbi-Quetta-Zahidan (Iran).
- A branch line from Quetta to Chaman and another Quetta to Zahidan (Iran); no railways in the rest of Balochistan.
- None in upper KPK and most of northern mountains and GB province.

Factors Affecting Distribution of Railways:

A. Natural/Physical Factors:

- Highly rugged land of the northern and western mountains: GB province, upper KPK and north-western Balochistan.
- Sub-freezing temperatures and heavy snowfall restrict any major railway project in GB province, Chitral, Murree and Galiat region.

B. Human Factors:

- Lack of funds and skilled workforce in GB province and upper KPK.
- Difficult and expensive to carry heavy machinery in the mountainous regions.
- Difficult to work in very cold and snowy winters.
- Political instability: failure of various governments to follow a uniform policy.
- Lack of political will to develop the underdeveloped areas; mainly major cities remain the priority of all governments.
- Insecurity, violence and terrorism after the 9/11 tragedy and the war on terrorism have further restricted any development schemes.
- Expensive and less feasible to build railways in areas of very low population density, e.g., most of Balochistan and many parts of KPK and the whole of GB province.

Main Railway Routes:

- Peshawar-Karachi.
- Lahore-Karachi.
- Quetta-Chaman and Quetta-Zahidan etc.

Reasons for Deterioration in Performance of the Pakistan Railways:

- Lack of investment by the government and private sector.
- Worn out and damaged rails and sleepers
- Operational inefficiencies in managing a convenient schedule.
- Overstaffing and corruption in the railway staff.
- Uneconomic stations and closure of unpopular routes.
- Single track on most of the routes; only recently dualisation completed Karachi to Lahore a small segment in southern Punjab has dual track.
- Poor services: reservation, care of passengers during journey.
- Lack of interest by various governments to develop railways.

Improvements in Pakistan Railways:

- Replacing steam engines with diesel engines and start of electric traction from Lahore to Khanewal.
- Faster and non-stop trains on major routes; Shalimar Express, Karakoram Express and rail cars between major cities, e.g., Lahore and Rawalpindi.
- Building dual tracks on selected routes, e.g., between Khanewal and Lodhran on the Karachi-Peshawar route.
- Dual tracks completed Karachi to Lahore; Lahore to Peshawar in progress.

- More repair workshops; the oldest one in Mughalpura, Lahore is being improved; new workshops in Islamabad, Sukkur and Jhelum to repair and manufacture parts of carriages.
- Plan to revitalize KCR (Karachi Circular Railway) to ease transport of goods and passenger within the city; government plans to extend old routes, improve service and connect them to the newly built roads, bridges and flyovers; KCR operational in 2020.
- Work on Gwadar railway track to link it with the rest of Pakistan and then with the CAR's (Central Asian Republic).
- New and improved services; involving private sector for an improved reservation and ticketing system.
- New plans such as the Karachi Magno train; elevated rail tracks to ease flow of transport in the largest city of Pakistan.
- Orange Line Train, 2016, being built in Lahore to reduce burden on road transport; proposed projects of this train service in other major cities too.
- BRT (Bus Rapid Transit) Peshawar, started 2020

Advantages of Rail Transport:

- Suitable for carrying bulky, non-perishable and low-value goods, e.g., raw materials.
- Safer and faster than road transport as there are no traffic jams, and uniform surface of rail tracks.
- Cheaper for bulky goods to be carried over a long distance as one railway engine pulls several wagons containing huge load.
- More comfortable journey than road transport means.
- Usually, less frequent repair and maintenance needed, though the terrorists have now started disrupting railways.

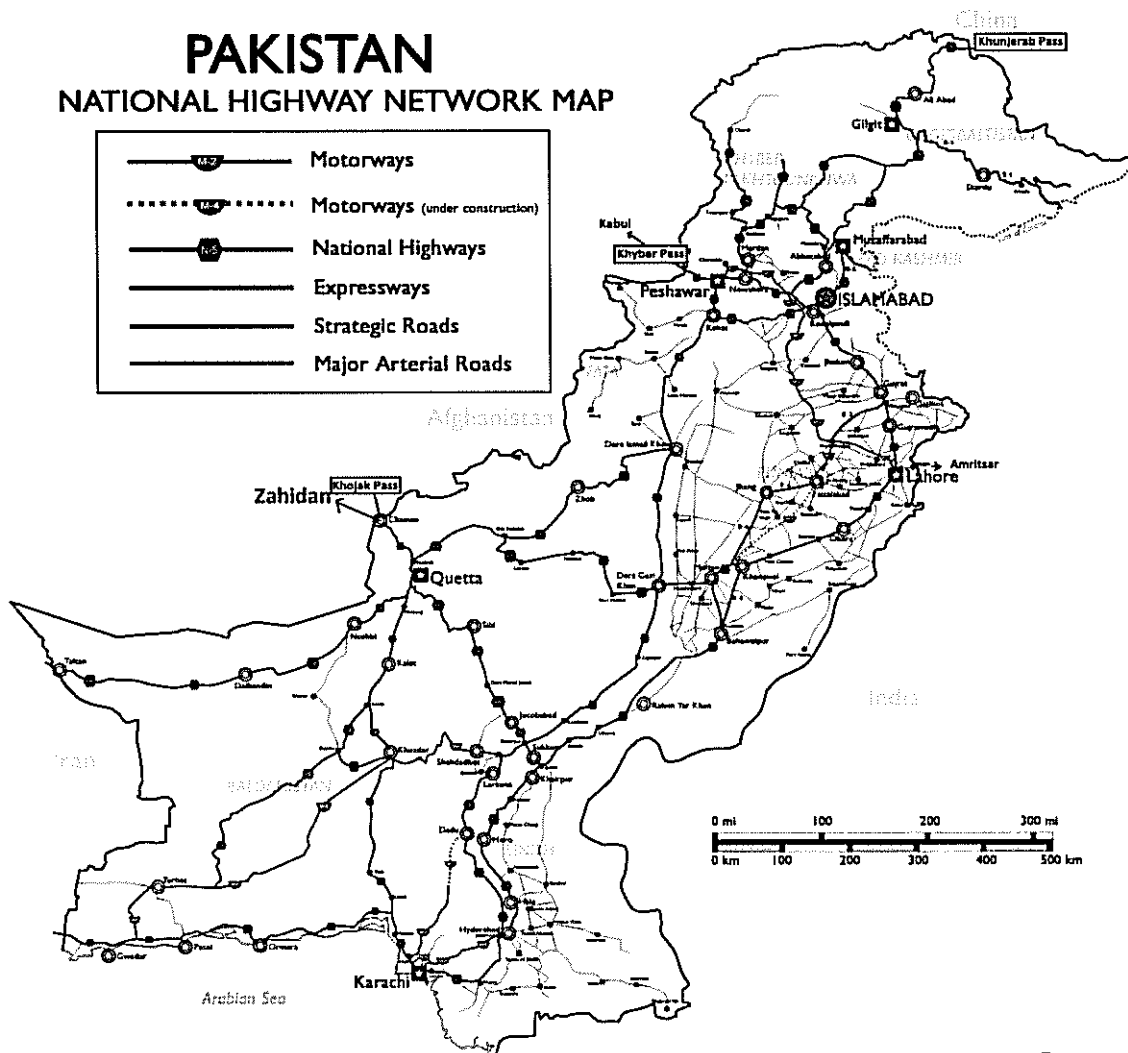
Disadvantages:

- Not suitable for perishable and high-value goods.
- Door to door service is not possible.
- Delays are common due to a poor management of the schedule of trains and absence of dual track in most parts of Pakistan.
- Inflexible timetable; more people prefer to avail road transport.
- Less extensive network of railways as compared to that of roads.
- More frequent handling of goods; the luggage is first taken to the railway station, then loaded on the train; on the destination station, the luggage is similarly handled twice.
- Difficult and expensive repair and maintenance of rail tracks.

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2. Road Transport:

Major Highways and Roads:



- N-5: two major components, (a) G.T. Road, Peshawar-Lahore and (b) the National highway, Lahore-Karachi.
- N-5 runs east of the Indus.
- The Indus Highway runs west of the Indus; shorter route between Peshawar and Karachi but less popular than N-5; from Kotri to Karachi it becomes Super Highway.
- The RCD Highway: Karachi-Quetta-Iran-Turkey.
- Lahore-Quetta Highway.
- Sukkur-Quetta Highway.

Distribution of Roads in Pakistan:

- Extensively distributed throughout Pakistan.
- All provinces connected by various highways.
- A mix of Pucca/metalled and Kacha/unmetalled roads.
- More popular highways located east of the Indus.
- Some phases of the Motorway completed, while others under construction.
- Karachi-Gwadar/Makran Coastal Highway, built early 2000s.

Makran Coastal Highway



Factors Affecting Distribution of Roads:

- Cheaper and easier to build in plain areas, e.g., the Indus plains.
- Many major highways had been built much before independence.
- In rugged and less populated areas, Kacha roads can be built; more expensive and difficult to build Pucca roads in the northern mountains/GB province and many parts of western mountains.
- Earthquakes and heavy snowfall restrict building of good quality highways.
- Difficult to build in the Upper Indus Plain due to five rivers across which long bridges have to be built; easier to build in the Lower Indus Plain and the coastal areas.
- Better quality roads connecting major towns are more feasible than in the low population density areas and deserts.

Cross-border highways connecting Pakistan with its neighbours include:

KKH (Karakoram Highway):

- Connects GB province of Pakistan to China through the Khunjerab Pass.
- Completed by Pak-China collaborative efforts in 1979.
- Source of:
 1. promoting trade, cultural links and political relations with China.
 2. development of GB province.
 3. promoting industrial development by setting up industrial estates and zones along the KKH; in the long run it will attract a greater number of tourists.



Other Cross Border Highways include:

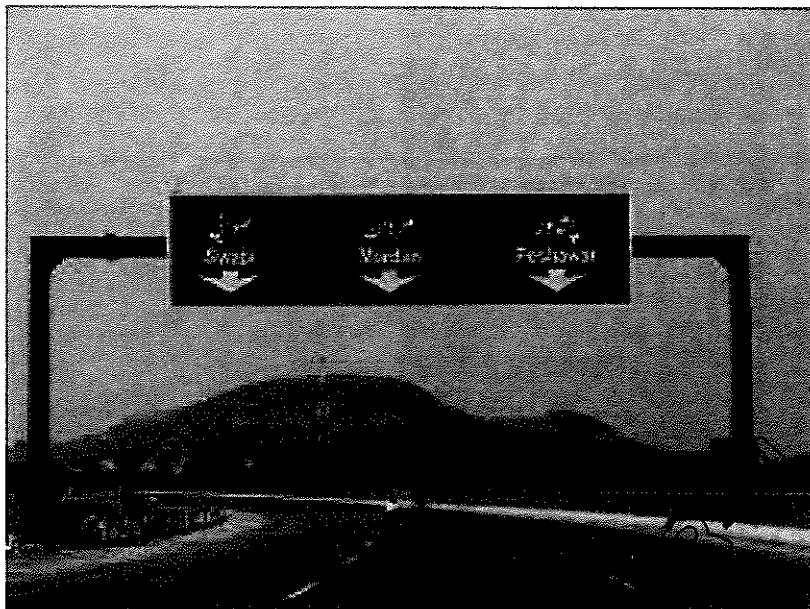
- G.T. Road: Pakistan-Afghanistan and Pakistan-India.
- Quetta-Qandhar Highway: Pakistan-Afghanistan.
- RCD Highway: Pakistan-Iran.

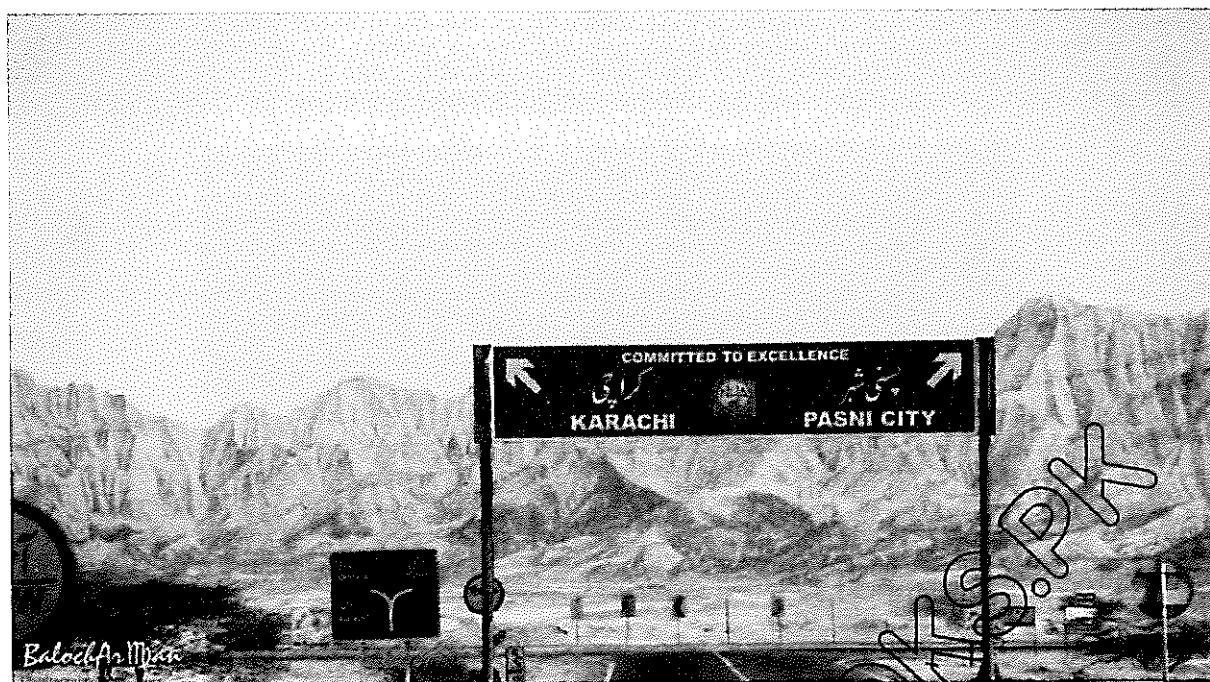
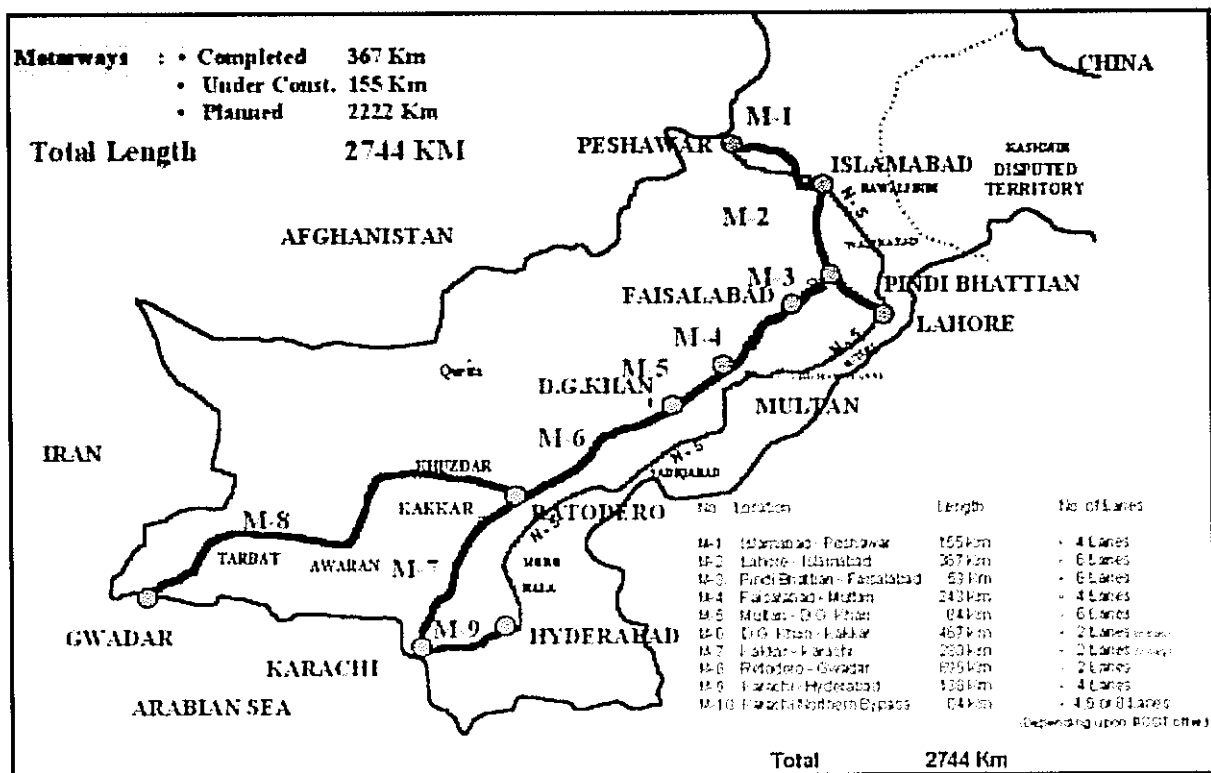
Motorway

- Started by the Sharif government in 1990; M-2 completed during the second term of Mr. Nawaz Sharif, 1997-1999.
- Most recent development; M-1 (Peshawar-Islamabad), M-2(Islamabad-Lahore) and M-3 (Pindi Bhattian-Faisalabad) are operational; several other phases are also operational by 2020.

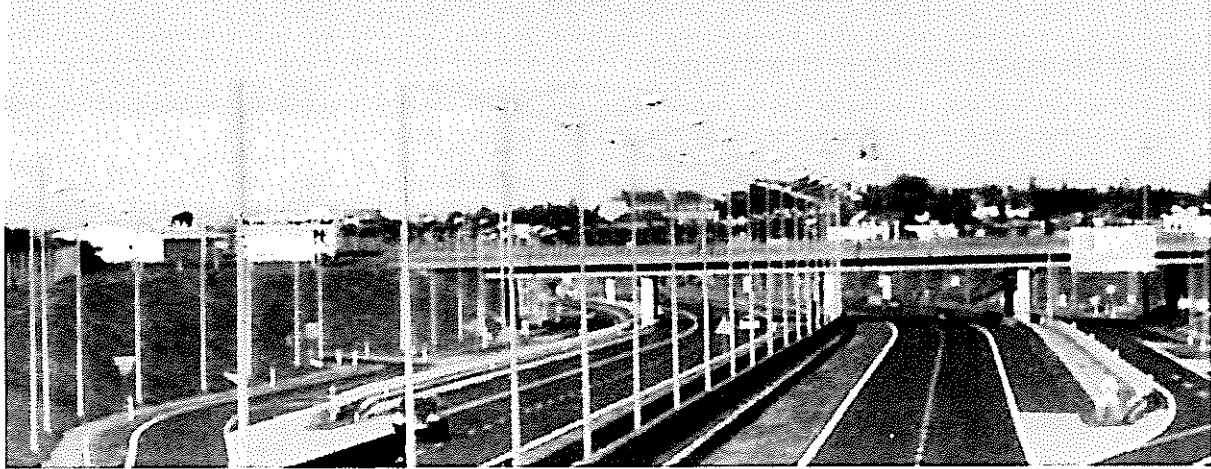
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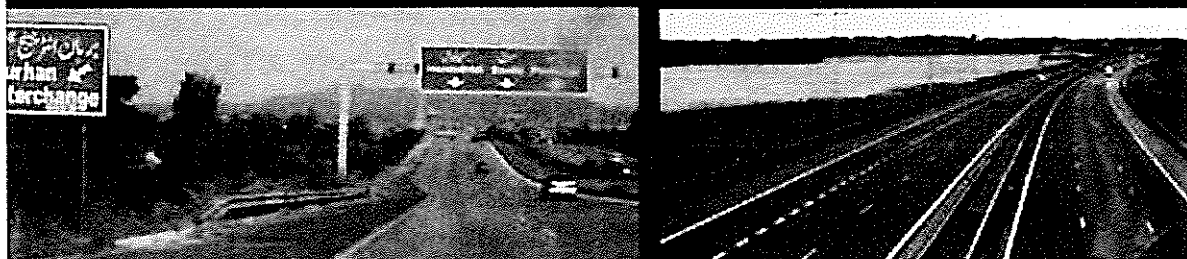




Motorway to KPK(Khyber Pakhtunkhwa)



Hazara Motorway, November 2014



Need and Importance:

- To relieve pressure on N-5.
- Faster and quicker transport.
- Industrial estates and zones along Motorway can boost industrialization.
- Connects areas of raw materials with factories and markets through a number of interchanges.
- New housing schemes being developed along the Motorway.
- Passengers and tourists prefer to use it for a faster and more comfortable journey.
- Long term prospects include its connection with the CAR's (Central Asian Republics).
- The Sharif government planning to connect it to China as part of the mega project, CPEC (China-Pakistan Economic Corridor), work on which started in 2015.

Advantages of Road Transport:

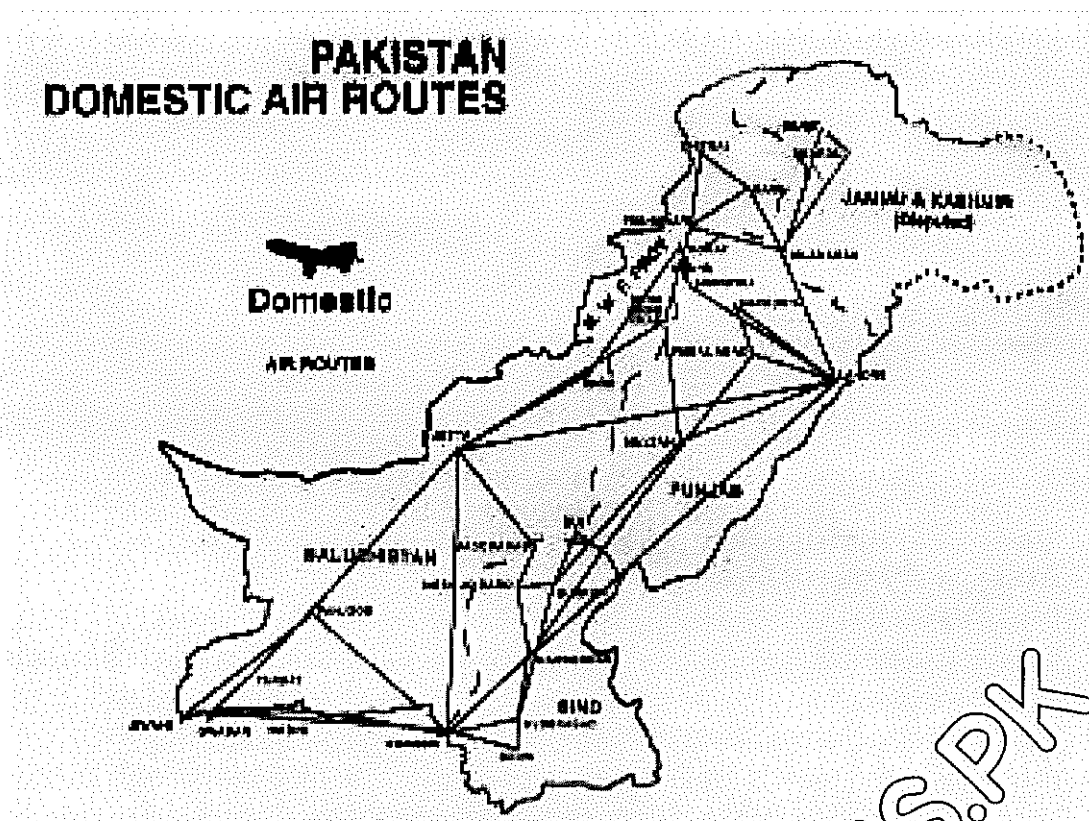
- More extensive network than railways; have a better and greater accessibility.
- Suitable for non-bulky, high-value goods and perishable items, e.g., food products.
- Cheaper for carrying goods over a shorter distance.
- Highly flexible timetable due to competition among various private sector companies.
- Introduction of superior quality vehicles with greater in-bus services.
- Door to door service possible.

- Less frequent handling of goods; once the luggage is loaded, it is unloaded at the destination.
- Easier and cheaper repair and maintenance of roads.

Disadvantages of Road Transport:

- Not suitable for bulky goods and longer distance.
- Chances of delay while passing through major cities.
- Lesser safety than rail transport as buses and other vehicles are easier victim of robberies.
- Less comfortable journey than that by trains.
- Heavy vehicles like oil tankers damage the quality of roads.

3. Air Transport:



Distribution of Air Routes within Pakistan:

- Extensive distribution.
- Routes spread throughout Pakistan.
- Greater number of flights from major cities, e.g., Karachi, Lahore, Islamabad and Peshawar.
- Flights from Quetta to 5 destinations only.
- Lesser number of flights from smaller towns.
- Gilgit and Skardu airports located in the extreme north of Pakistan.

Factors Affecting the Location of Airports:

Helping Factors/Advantages:

- Major towns with greater industrial and trade activity.
- Easier to build on flat land, e.g., the Indus plains and the coastal areas.
- Moderate and tolerable climate keeps airports open throughout the year.
- Support by the government and interest shown by the local people; best example is the Sialkot International Airport.

Hindering Factors/Disadvantages:

- Expensive and difficult to build in the northern mountains/GB province due to highly rugged landscape.
- Difficult to operate during winters due to heavy snowfall and very low temperatures.
- Lack of flat land to build a good runway.
- Problem of transmission of radio signals and radar operation in very high mountains.
- Poor visibility due to fog and heavy snowfall.
- Lesser than expected return if built in smaller towns; Mingora Airport in Swat had to be closed due to lesser number of passengers and later on, terrorism in the region.
- Growth of terrorism has further restricted the building of new airports.

Reasons/Factors for the Growing Popularity of Air Transport:

Internal Factors:

- Fastest, safest and most comfortable means of transport.
- Suitable for high-value, lightweight goods, e.g., gold jewellery and surgical instruments.
- Accessibility to mountainous areas, e.g., Gilgit, Chitral, Skardu.
- Increased affordability due to improved standard of living.
- Growth of private airlines to compete with the PIA, e.g., Air Blue, Shaheen Airlines, and Airsial (started in 2020).
- Establishment of new airports, e.g., the Sialkot International Airport.

External Factors:

- Increased cargo transport to the Middle East in recent years, e.g., fruits, vegetables etc.
- Growth of tourism and business.
- More migrations; world becoming a global village.
- Increased popularity of education in the major institutes of the world, e.g., Harvard University and London University.
- International political disturbances and disputes, more frequent travelling of the UN and other international political delegates.

Recent Improvements in Air Transport and Their Feasibility:

- Establishment of the world's first ever private sector built international airport at Sialkot.
- Improved services by the PIA and the airport authorities, e.g., the installation of moving walkways in the Jinnah terminal at Karachi.
- New international airports, e.g., Allama Iqbal International Airport, Lahore; the new airport in Islamabad completed in 2018.
- Installing anti-fog lights at Allama Iqbal International Airport, Lahore.
- Improved security arrangements at all airports and empowering the ASF (Airport Security Force) and the ANF (Anti Narcotics Force) to eliminate smuggling and counter terrorism.
- Building of flyovers and broader roads around the Lahore Airport.
- Improved flight control system.
- However, political instability in Pakistan, lack of political will, insecurity and terrorism coupled with corruption and mismanagement of funds by the public sector institutes act as the major bottle necks in any major improvement in air transport.

Advantages of Air Transport:

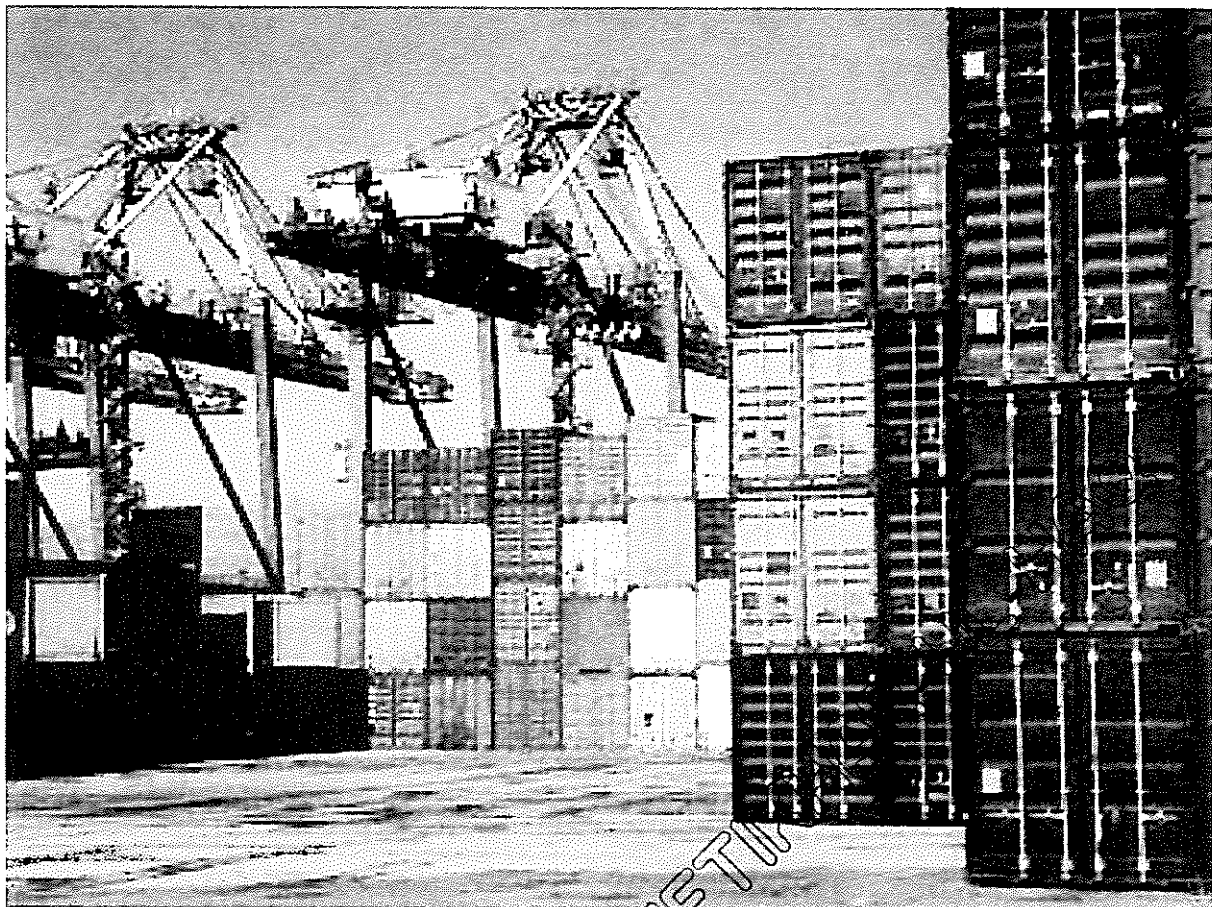
- Safest, fastest and most comfortable means of transport.
- Accessibility to areas which are not easily accessible by land.
- Suitable for transport of highly precious and non-bulky goods.

Disadvantages of Air Transport:

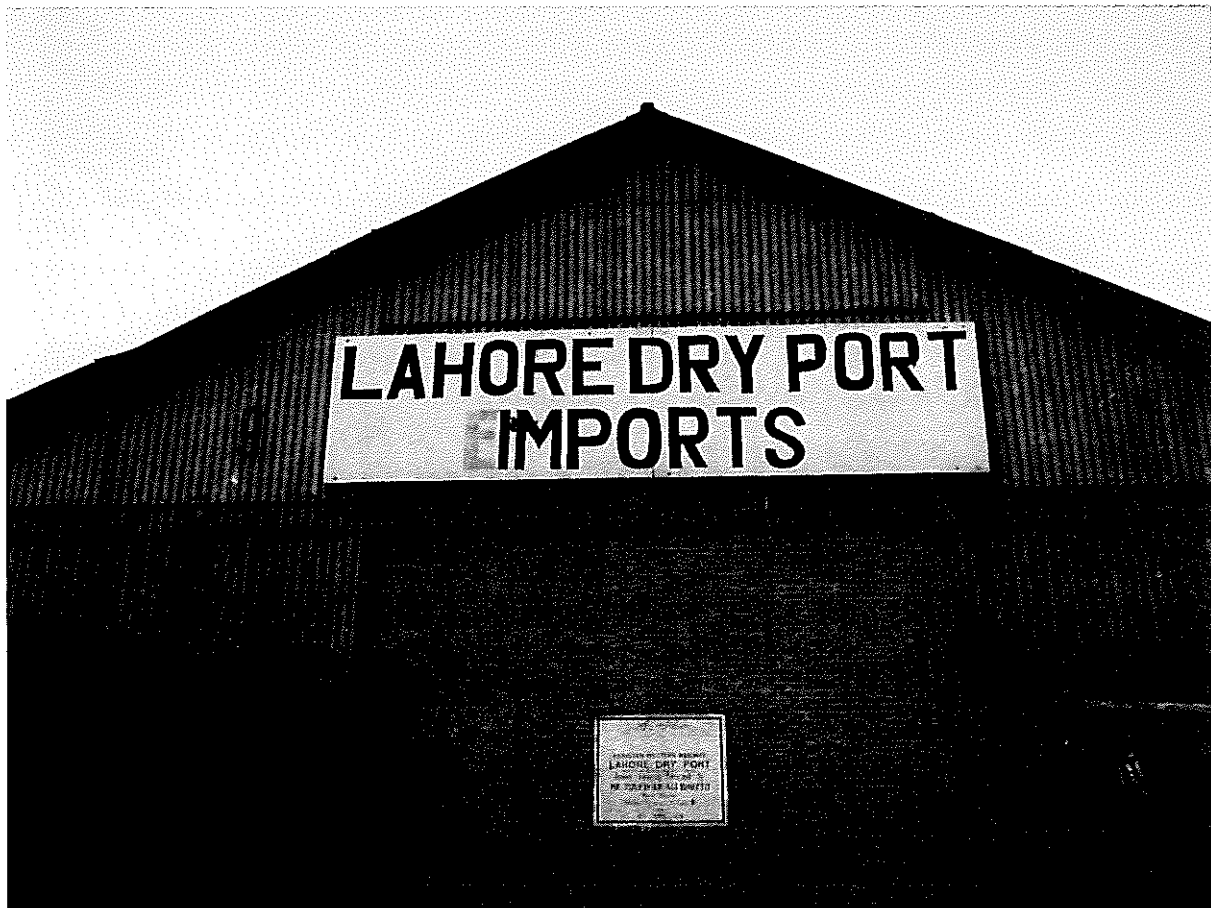
- Most expensive means of transport.
- Not suitable for carrying bulky and low-value goods.
- Though rare, the air transport accidents are always fatal.
- More thorough security checking due to the growth of terrorism.
- Deteriorating services of the PIA as well as the private airlines.
- Poor maintenance and repair has led to a greater number of accidents.
- Delays due to poor management, heavy snowfall, poor visibility due to fog, and interference by the high profile political figures: the so called VIP (Very Important Personality) culture in Pakistan.

Dry Ports:

- A dry port provides most of the port facilities such as packaging and storing of goods and documentation and customs clearance services to save the time of traders.
- Examples: Mughalpura Dry Port, Lahore and dry ports in Peshawar, Quetta, Faisalabad and Multan.



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Why set up:

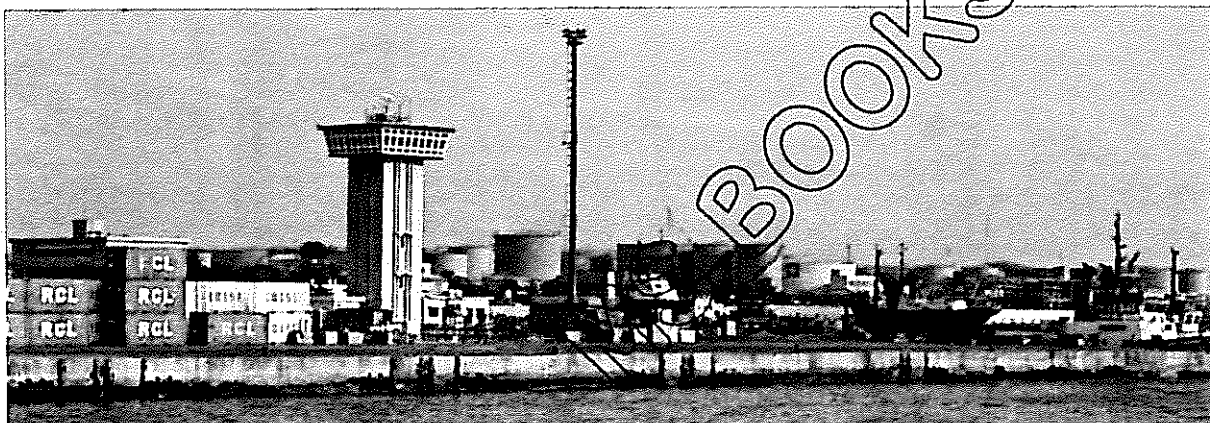
- To reduce load on the ports (Qasim, Kemari).
- To ensure smooth collection of revenue.
- To save time of exporters and importers; transport of goods from factory to the port.
- To stimulate foreign trade and to earn foreign exchange by increasing exports.

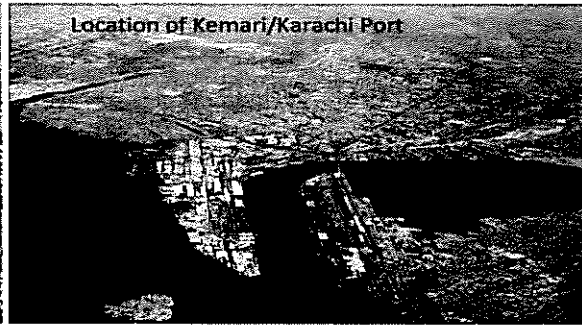
4. Water Transport:

Ports of Pakistan:

Major ports:

Kemari/Karachi Port: West of Indus Delta at Karachi; deep sea port, with a number of wharves (landing stages); open throughout the year.

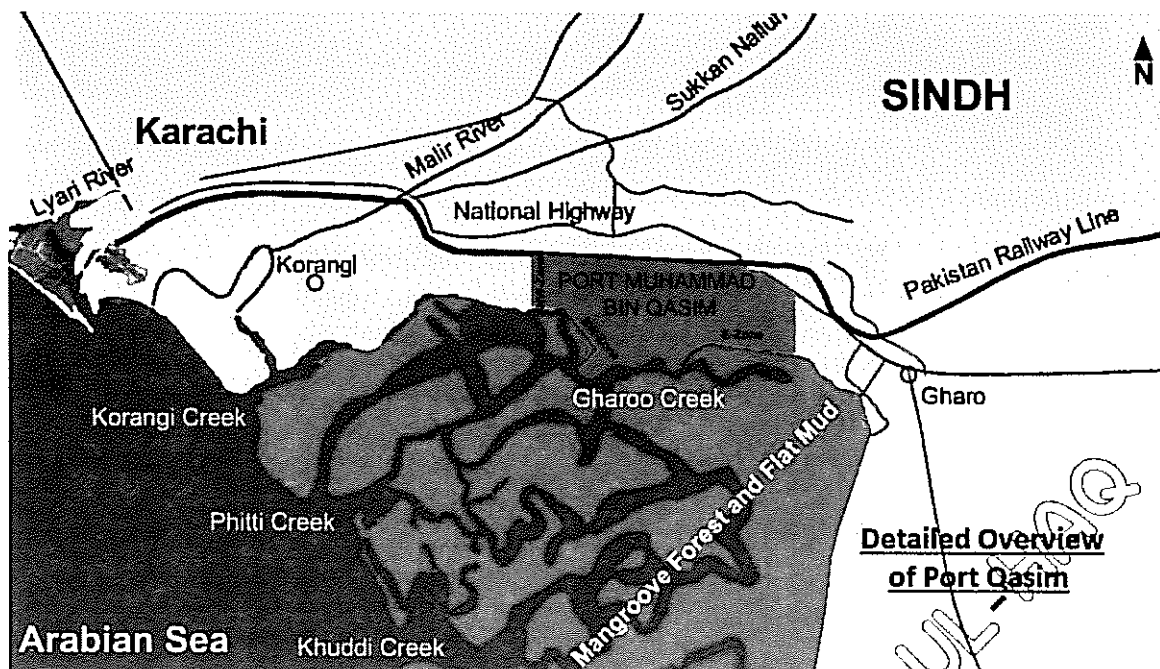




Developments at Kemari Port

- New terminals; liquid products terminal, container terminals at west wharf.
- Flyover bridges connecting/bypassing the port area.
- Reconstruction of berths to handle more cargo
- Navigational aids and radars
- Improved storage facilities
- Environmental protection equipment to minimize sea water pollution.

Port Qasim:



- 20km, south-east of Karachi, at Gharo Creek.
- 2nd deep sea port, built in 1980, to handle cargo of Pakistan Steel Mill, Pipri.
- Also handles other imports and exports.
- Performs the combined function of deep sea port and an industrial zone with these industries: cotton textile, chemicals, paper and board and assembly industries.
- Main cargo; iron ore, coke, manganese (all for PSM), oil, grains, rice, edible and furnace oil, jute, fertilizers and LPG containers.

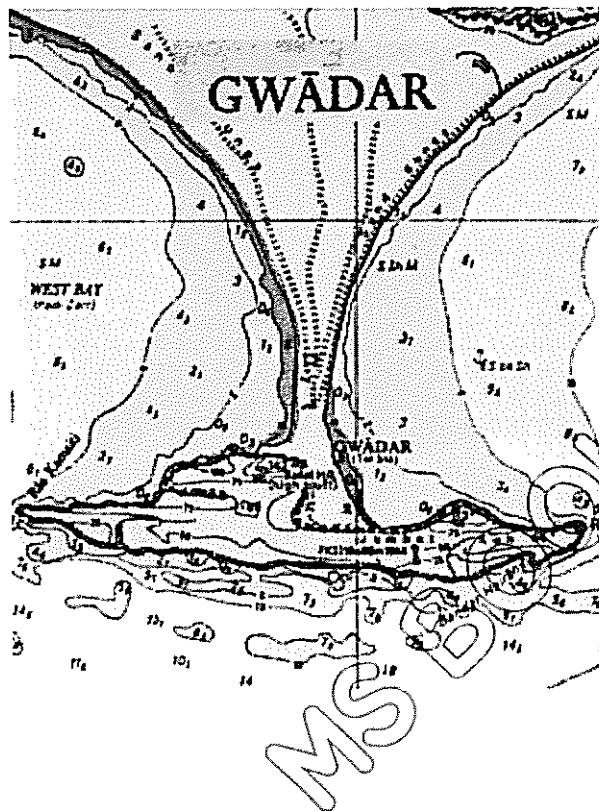
PNSC (Pakistan National Shipping Corporation):

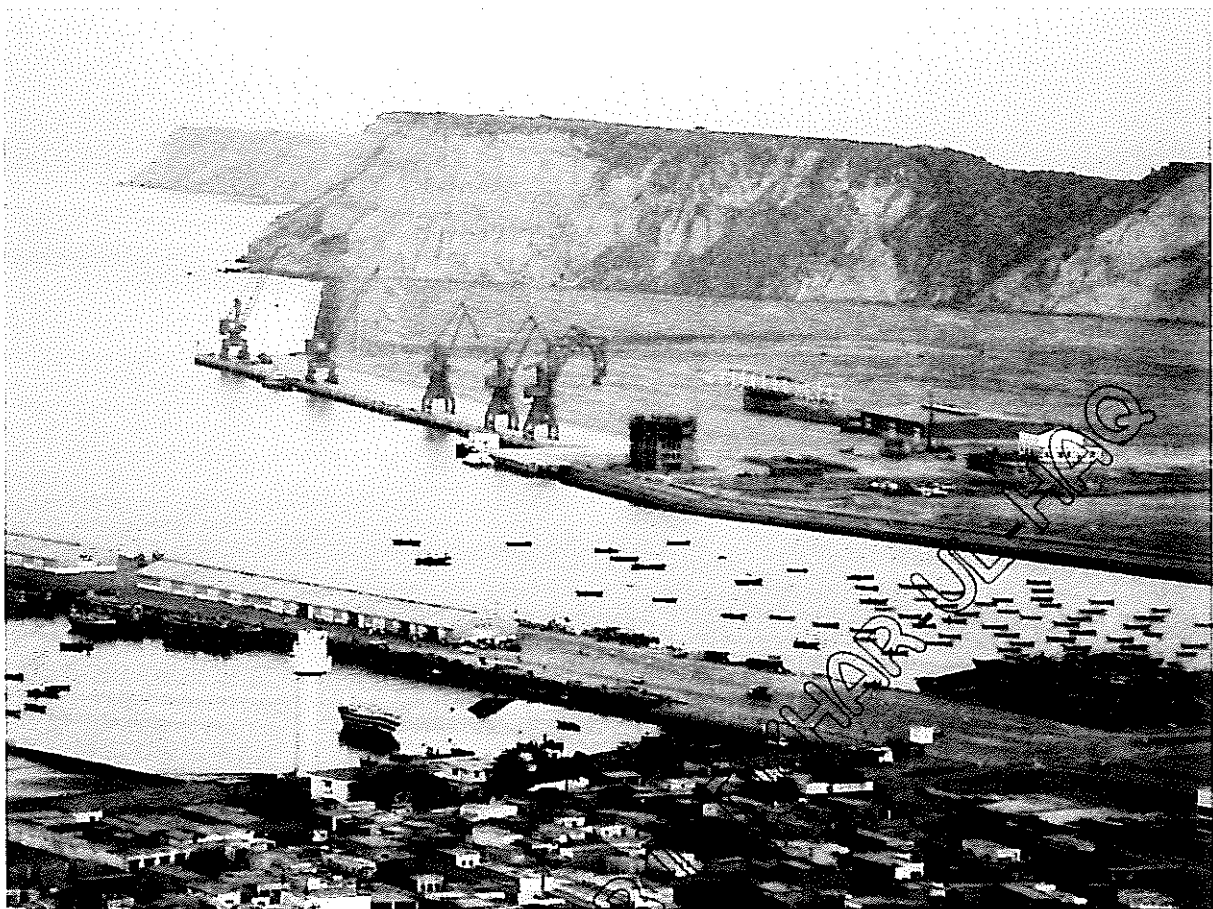
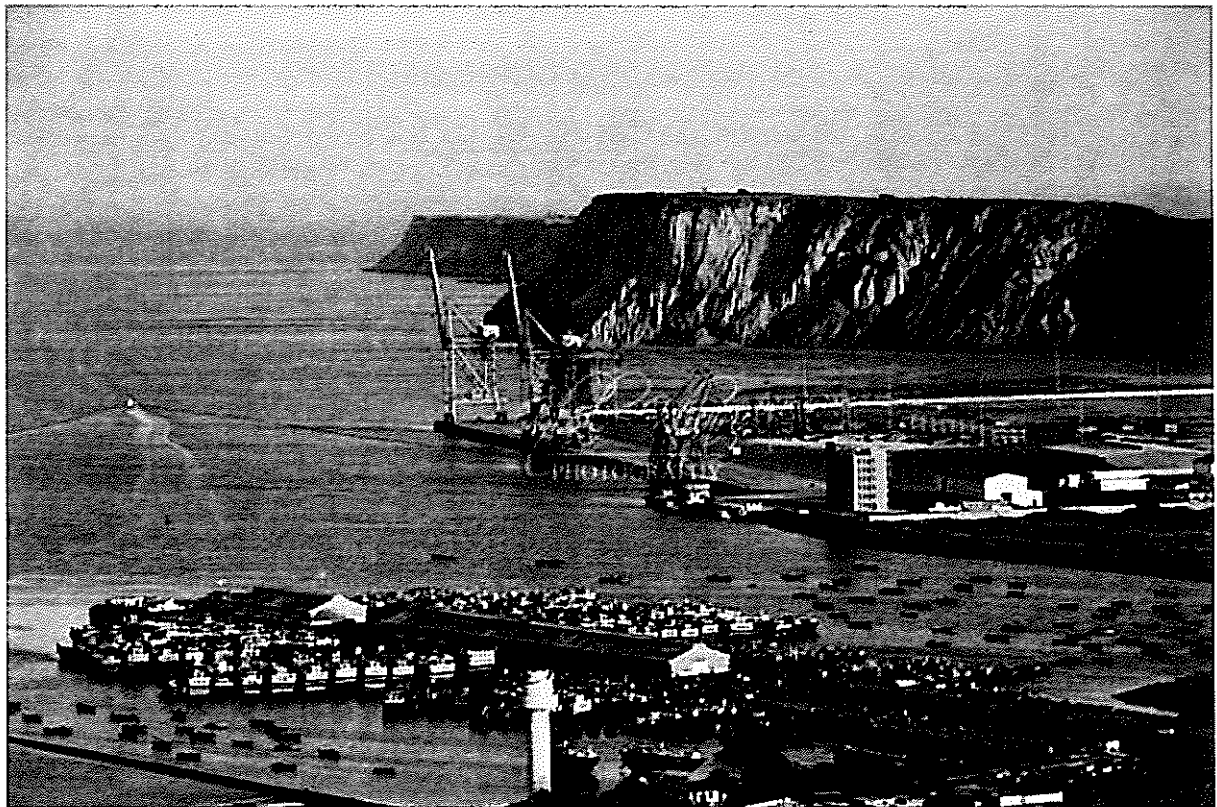
- Set up, 1979, to promote shipping industry and water transport.

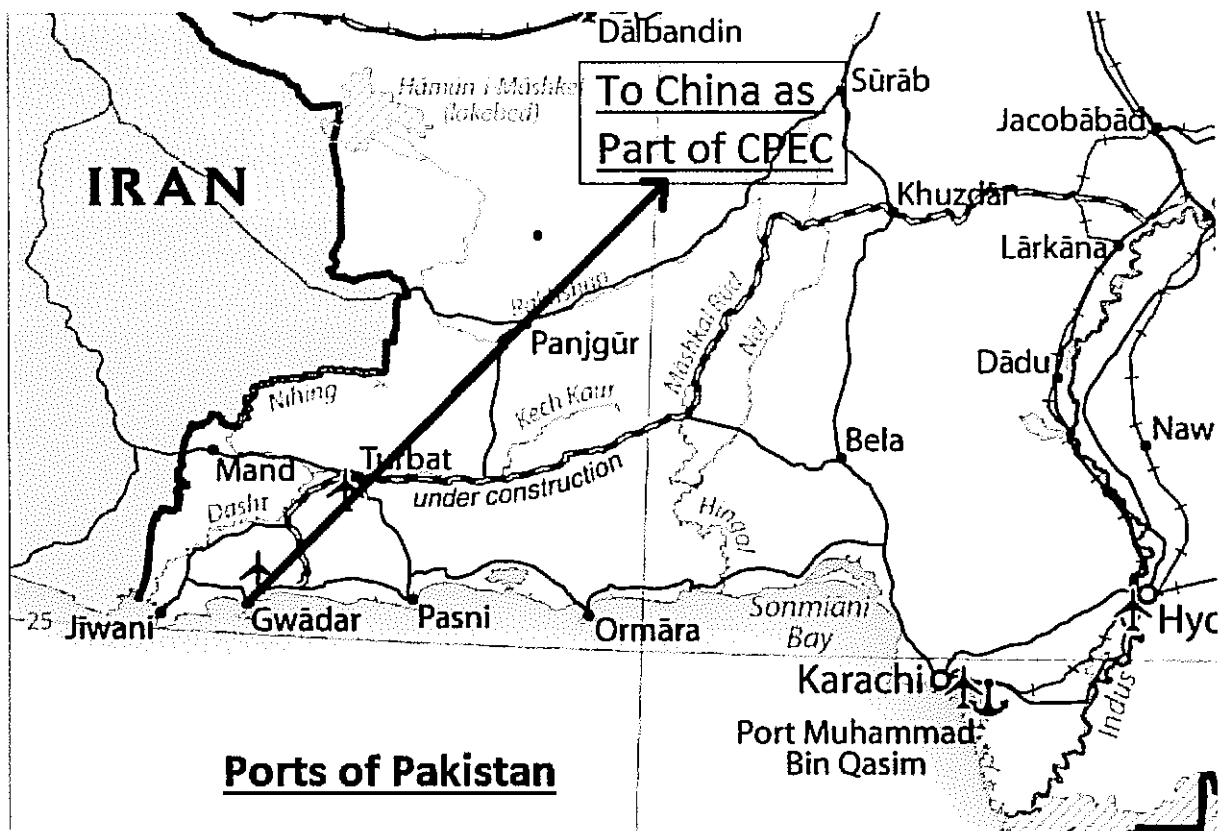
Importance:

- Link between Pakistan and its trade partners
- To stabilize freight rates
- To save Pakistan's foreign exchange

Gwadar Port:



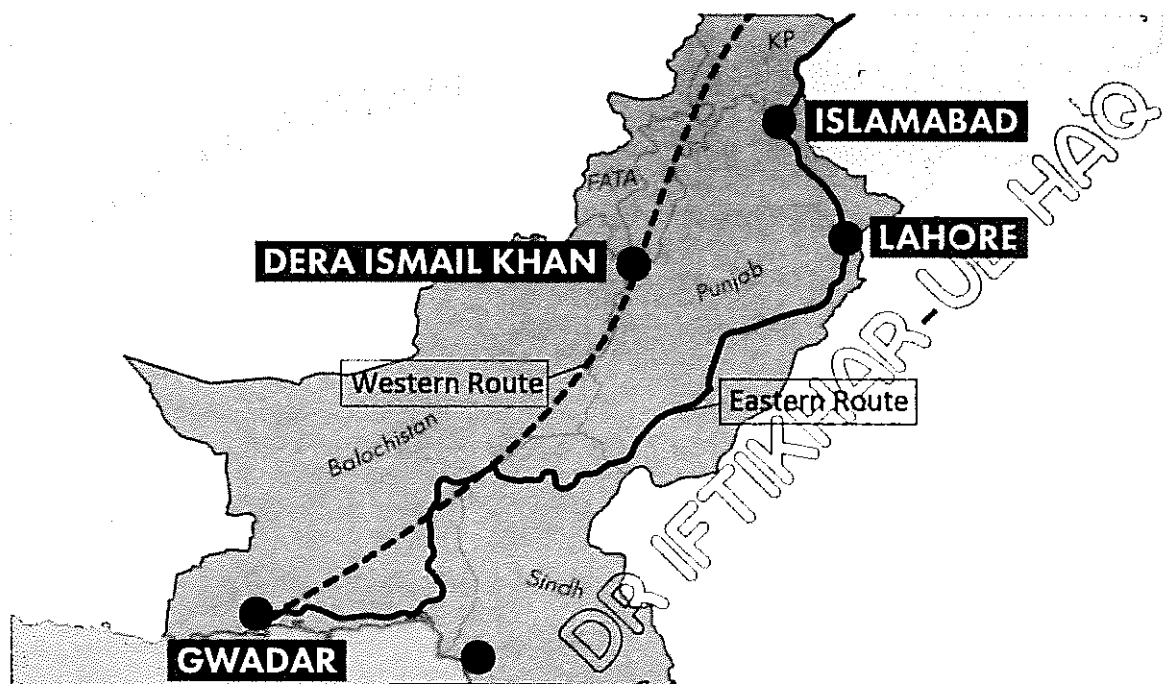




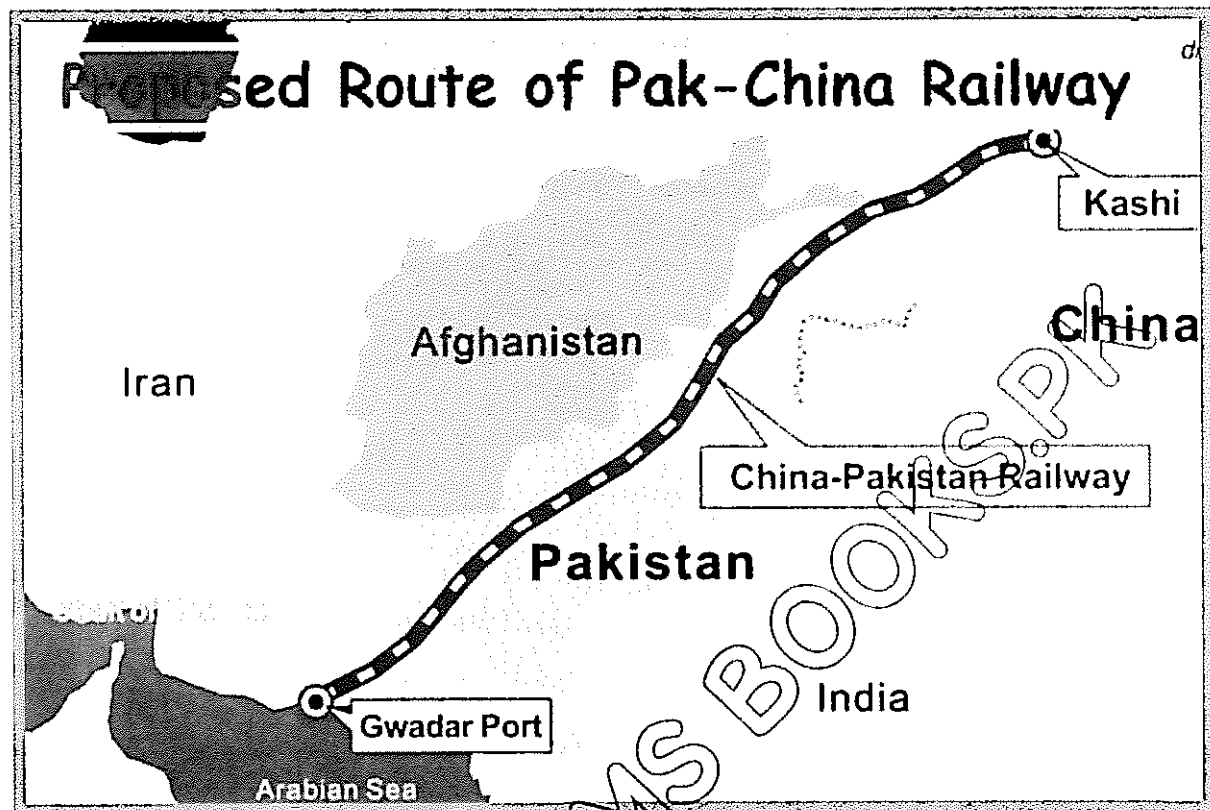
- Located on the Makran Coast; spread over 2500 acres; being developed with the Chinese aid.

Importance:

- Source of reducing burden/reliance on the Kemari and Qasim ports.
- Balochistan is the least developed province; export of fruits and minerals of Balochistan; many mineral extraction projects already in progress with the help of Chinese aid.
- Possibility of growth of some related industries; fishing, engineering, services (hotels, restaurants) etc.
- May provide transit trade facilities to Afghanistan and CAR's (Central Asian Republics), nearest land-locked countries; chances of improved relations with these states and earning from transit trade charges.
- By setting up warehouses of CAR's and Afghanistan, possibility of additional earnings.
- Development of Gwadar will create plenty of jobs for the local Baloch population.
- Will stimulate growth of construction industry; housing scheme etc.
- Gwadar is a good site for building EPZs (Export Processing Zones) and industrial estates; such projects will boost local economy and improve Pakistan's economic growth.
- Eventually it may become a centre of international port traffic due to its strategic location: near the mouth of the Gulf of Oman and the Straits of Hormuz; 66% of the world oil and 30% of gas reserves are located in the Gulf region.
- Nearness to the Middle East: the UAE, Oman, Saudi Arabia etc.; this will facilitate easy and quick trade with these states.
- Several development projects will attract local and foreign investors, depending on political conditions of Pakistan.
- The Sharif Government (2013-2018) has started work on linking Gwadar with China under the CPEC (China-Pakistan Economic Corridor).
- CPEC is a mega project aimed at improving Pak-China relations and building a strong regional economic bloc; work in progress.



China-Pakistan Economic Corridor Gwadar-Khunjrab Routes



Infrastructure Development in the Gwadar area:

- WAPDA is working on building a grid station for power supply.
- Water supply from the Akrcore Dam, Mirani Dam and Dasht river and desalination plant to purify sea water.
- 18,000 hectares to develop rail link with other parts of Pak; 700km Makran Coastal Highway to Karachi; a proposed highway to CAR's; these states might use the Gwadar Port for promoting trade as an alternate to Russia.

Disadvantages/Limiting Factors of the Development of the Gwadar Port Project:

- Political instability in Pakistan; usually governments failed to complete their tenure.
- Lack of trust between Balochistan and the Central Government.
- Sectarian violence and terrorism in Balochistan, mainly due to the infiltration of the Afghan refugees hinder any development project in Balochistan.
- Government of Pakistan suspects involvement of the Indian secret agency RAW (Research and Analysis Wing) in terrorism and violence.
- The Gulf states, especially Iran, the UAE and Saudi Arabia feel their monopoly in the Gulf region threatened; an evidence of this is the proposal of developing the Iranian Chahbahar Port with the Indian cooperation to counter the Gwadar Project and the CPEC.
- Baloch tribal chiefs are also opposed to various development schemes in Balochistan.

Advantages of Water Transport:

- Suitable for transporting bulky, non-perishable and low value goods.
- Much cheaper than air transport for longer distances.
- Pakistan can make extra earnings by providing transit trade to the neighbouring land-locked states of Afghanistan and Central Asia.

Disadvantages of Water Transport:

- Very slow transportation of goods and passengers.
- Violent storms and cyclones may create serious difficulties
- Chances of piracy.
- Not suitable for perishable and high-value goods.

Importance of an efficient Transport System:

- **Socio-economic and Political Benefits:**
 - More social welfare schemes; provision of health and education to masses; social and cultural linkages within Pakistan and eventually with other cultures.
 - More economic activity: balanced and sustained growth, increased trade and industrial activity, more jobs for the people and more revenue for the government; stability of prices.
 - Link between rural and urban areas; prosperity in rural areas and geographical/regional specialization, e.g. rural areas specialize in cottage and urban areas in large scale industries.

- Politically: better security and defence, improved law and order (rapid mobility of law enforcement agencies, e.g., police) and better degree of political awareness among masses.

Telecommunication (TC):

- TC devices: radio, TV, fax/facsimile, telephone, mobile phone and computers with the internet.
- They ensure rapid communication on long distance by converting sound and images into signals/waves and reconvert these into transmitted sounds/images.
- The internet is the latest device as it:
 - sends and receives emails very efficiently.
 - develops websites on the www.
 - provides information by a single click.

Importance of TC (Telecommunication):

1) In Education:

- Distance learning schemes, e.g. TV lecturers of the AIOU (Allama Iqbal Open University) and VU (Virtual University); a great variety of courses through correspondence, radio and TV.
- Teacher training programmes.
- Lectures can be saved in the software.
- Assignments, lectures preserved and projected through multimedia.
- Online workshops, competitions among students.
- Easy and quick access to the reputed institutes of the world to get information about admission, scholarships.

2) In Industry and Trade:

- Speedy access to: new technology, markets to sell/export goods, new products; this helps local producers to improve quality of their products.
- Overseas branches of multinationals, and the same may set up branches in Pakistan; transfer of technology and creation of jobs.
- Effective publicity through radio, TV, websites and social media (facebook, twitter etc.).
- Information about new market trends and market opportunities.
- Easy and quick transactions by e-commerce/e-banking to compete in a rapidly changing world by saving time and energy.

Government's Efforts to Promote TC:

- Internet centers, Cyber cafes on main airports, railway stations, petrol pumps and post offices.
- Educational channels on TV e.g. VU (Virtual University).
- IT towns, centers and cities in major universities; Arfa Karim IT Tower, Lahore (dedicated to the young computer wizard Arfa Karim).
- Software e.g. Urdu Software and other educational softwares.
- Data-based registration e.g. computerized identity cards, driving license and passports.

- Saving data in computers about all important institutes, industries and trade bodies.
- Establishment of PEMRA; Pakistan Electronic Media Regulatory Authority, to regulate working and use of TC devices.
- New ICT courses at junior and higher educational levels to create a team of ICT experts.
- Introduction of Cyber Wing in the police department to deal with the cybercrimes.

Hindering Factors/Disadvantages of Using TC (Telecommunication) and Providing TC Facilities to Remote Areas of Pakistan:

- High cost and lack of funds.
- Poor literacy rates in rural areas.
- Lack of skilled workforce in remote areas.
- Disturbance in receiving/sending signals in the high mountain areas.
- Waste of time: net chat addiction, social media addiction and video games.
- Chances of cybercrimes and hacking the websites of the sensitive agencies.
- Stormy winds disrupt the internet services.

New Question of two statements.

Statement A:

Rail transport is more efficient and cheaper for carrying goods and passengers. Pakistan should develop a modern railway system.

Statement B:

Roads are easier and less expensive to build and maintain. Pakistan should continue to build more motorways.

Q: Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

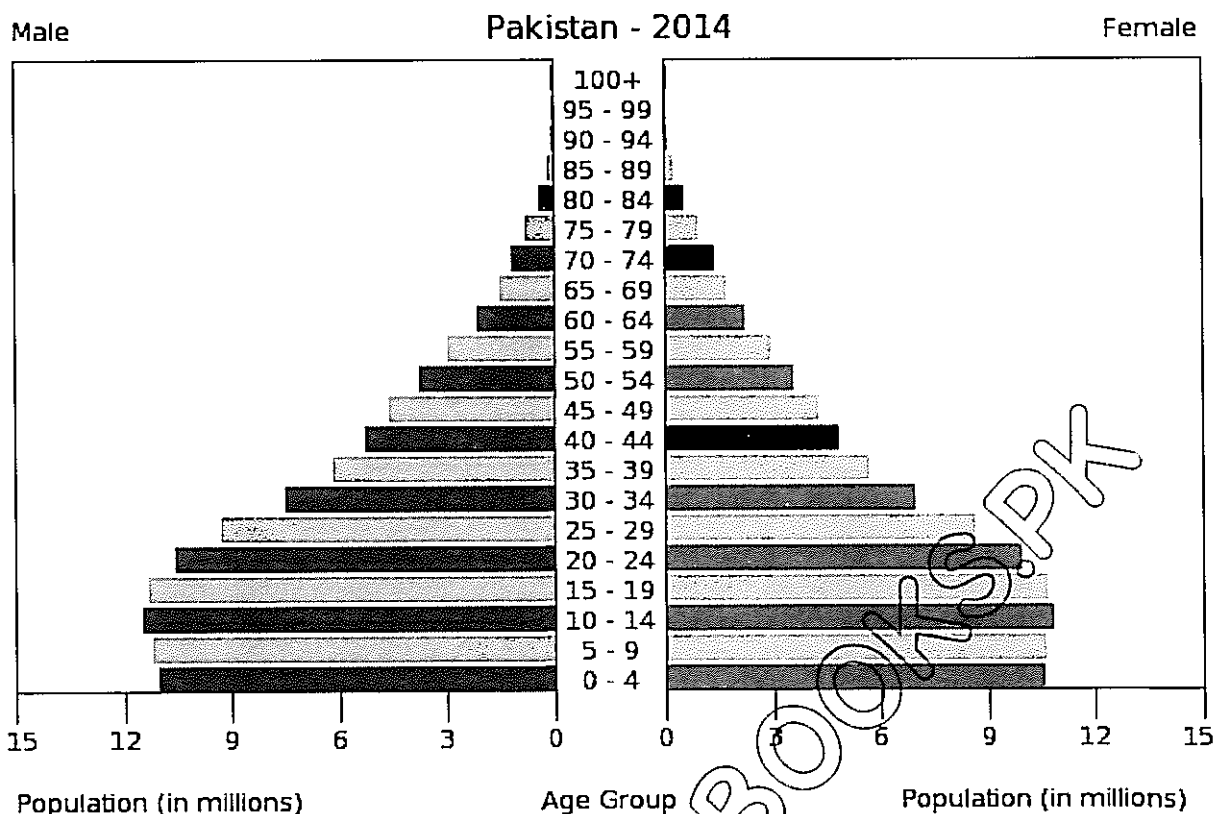
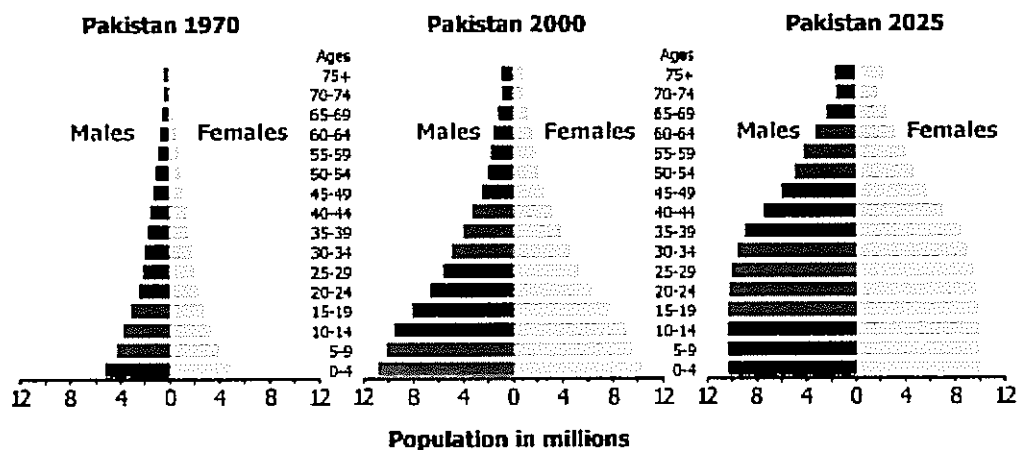
Building both Kacha/unmetalled and Pucca/metalled roads takes less time. However, road transport is not suitable for carrying bulky goods to distant locations. Use of heavy vehicles like oil tankers damages the highways. Buses carry lesser number of passengers and lesser bulky goods. Moreover, they provide less comfortable journey, and are less safe. Railway transport is more efficient than road transport as the trains run at a uniform speed without any traffic jams. Only initial cost of developing railways is high. If Pakistan develops a modern dual track railway system, as has already been done from Karachi to Lahore, it will ensure a swift movement of goods and workers. The Orange Line Train Project, Lahore and the Magno Train, Karachi can significantly lower the traffic load on roads. With the help of China, an advanced railway network can be built in Balochistan and northern mountainous regions. Such projects will stimulate economic activity in these areas while ensuring rapid movement of law enforcing agencies to deal with terrorists and anti-state agents.

CHAPTER 12

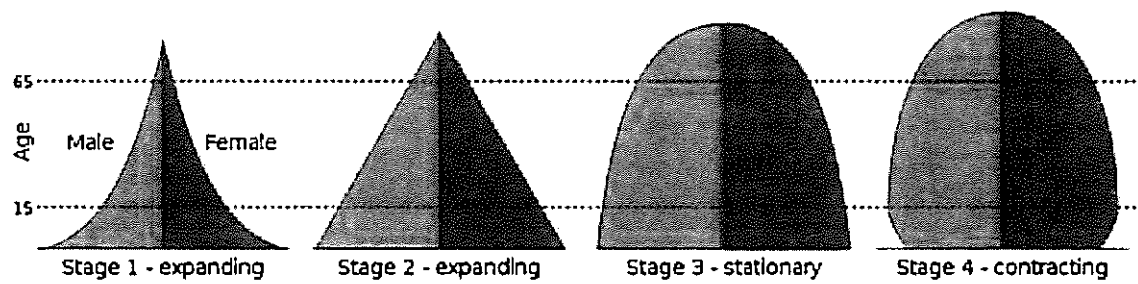
POPULATION IN PAKISTAN

Population Pyramid:

Also called an age pyramid or age picture diagram is a graphical illustration that shows the distribution of various groups in the population of a country. It helps in the economic planning of a country and guides about taking steps to control a high population growth rate.

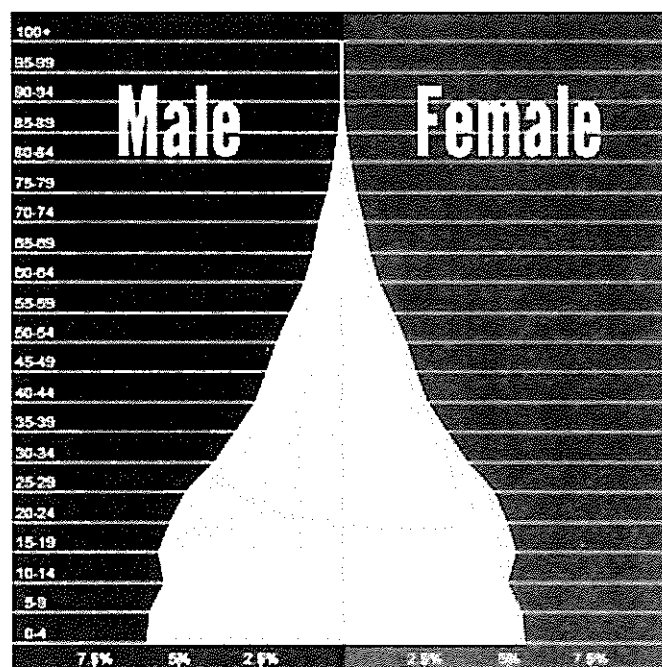


Population pyramids for 4 stages of the demographic transition



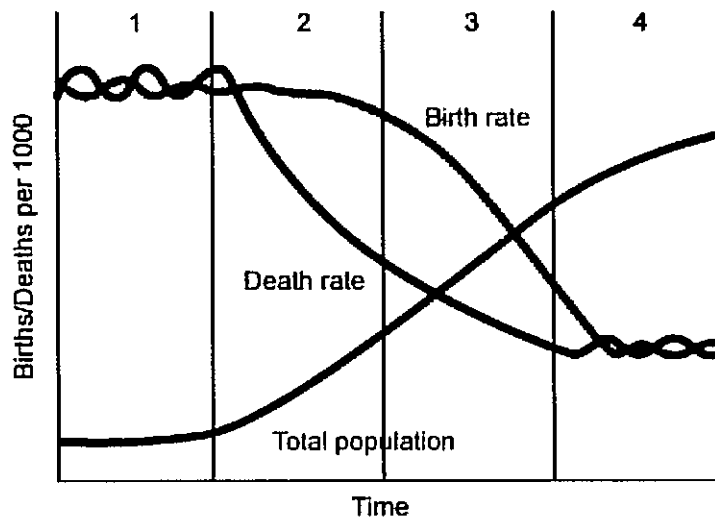
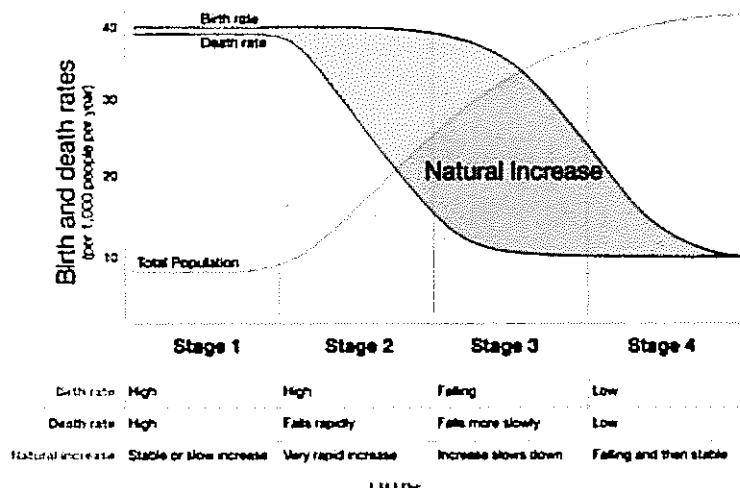
**Pakistan
2015**

Population **188.144.000**



DR IFTIKHAR-UL-HAQ

Demographic Transition Module with 4 Stages



- Stage 1, both birth and death rate are high due to poor family planning and lack of medical care.
- Stage 2, birth rate remains high due to a slow increase in literacy and failure of family planning schemes; death rate starts falling due to an improved standard of living and more awareness.
- Stage 3, birth rate starts falling because of an improved literacy rate, gradually decreasing infant mortality rate and family planning schemes getting popular; death rate keeps falling due to an increase in average life expectancy resulting from better medical care and a steady increase in awareness.
- Stage 4, Both birth and death rate keep falling as a result of improved literacy, more effective family planning, a decline in infant mortality rate and more jobs for women; more advanced medicines and improved living standard increase average life expectancy.

Average Life Expectancy

It means the average number of years an individual is expected to live when they are born. In Pakistan, like other countries, the average life expectancy has been constantly increasing due to a number of factors. (Details are discussed in the topics of birth rate and death rate.)

Population Growth:

- It is defined as the difference between the birth and death rates and migration (difference of immigrants and emigrants).
- Pakistan's population is 130.58 million according to the March 1998 census;
- 55% increase in population from the 1981 census with an annual growth rate of 2.6%.
- According to the 2017 census, total population is around 210 million as no census was conducted after 1998.

Natural Increase in Population:

It is defined as the difference between the birth rate and the death rate calculated over a period of time.

Reasons for High Population growth:

- Declined death rate due to: improved medical facilities, improved literacy and production of better quality food.
- Trend of having large families; many people prefer to have a family comprising 7-8 children; poor farmers believe that a greater number of children will share the economic burden by working on farms.
- Early marriages: an increased productivity/fertility span; a girl getting married at the age of twenty is likely to have many children as compared to the one who is married in her late 20s.
- Religious beliefs: many people strongly resist any family planning programs considering it un-Islamic as they believe that Allah makes arrangements for the provision of all needs of life; many religious scholars also oppose family planning schemes declaring them an interference with the dictates of Nature.
- Desire for sons: many couples keep producing children until the birth of a male child, thus increasing the size of their families.
- Poor literacy rate: about 50% of Pakistanis are still illiterate; the illiterate couples do not understand the benefits of a small family; they have poor knowledge about the use of contraceptives (devices to prevent conception/union of sperm and ovum); they tend to have a larger family.
- Inconsistent population welfare policies/family planning schemes due to political instability and frequent change of governments; also, poor advertisement campaign due to social and cultural restrictions.
- Arrival of millions of the Afghan refugees since 1980; Pakistan is still hosting 1.818 million Afghan refugees; these refugees do not observe any family planning.

Effects of a High Population Growth Rate:

- An increase in the young segment of the dependency ratio: age group of 0-15 years; this may increase the child labour as more people have to share the economic burden of the family.
- Burden on economic resources; government has to spend more to provide education, health care, jobs and housing facilities to a greater number of people.
- Adverse effects on the health of the family members if they are living in a congested environment with little space for each member.
- More unemployment and a rise in crime rate as a result of a prolonged state of unemployment; more poverty and poor health.
- More people migrate from rural to urban areas as they are unable to find appropriate jobs in rural areas.
- Adverse effects on the health of women due to a small interval between many births.

- With a greater number of healthy adults, more workforce available for primary, secondary and tertiary sectors of economy.

Measures to Reduce a High Population Growth to ensure a Better Economic Development:

A tri-pronged strategy is needed for the economic development of Pakistan:

1. Controlling a high population growth rate:

Controlling a high birth rate by such measures as:

- Creating awareness among the rural people.
- Improving the efficiency of the family planning schemes; encouraging the NGOs (Non-Governmental Organizations), e.g., the Green Star/Sabz Sitara and the Green Key/Sabz Chaabi projects; launching an aggressive advertisement campaign.
- Seeking the support of religious scholars so that they can influence the masses.
- Provision of cheap contraceptives especially in rural areas; utilizing the trained women like the LHWs (Lady Health Workers) that can educate rural women about family planning while distributing contraceptives and family planning literature.

2. Adopting the strategy of human resource development by:

- Improving female literacy and creating jobs for women because working women tend to have lesser number of children; they don't get married at an early age; they have a better knowledge of family planning schemes and use of contraceptives; more educated women are ambitious to improve their social status; they can influence less educated and illiterate women to have lesser children.
- Giving priority to providing education to rural and urban areas, including 'adult literacy' and distance learning schemes.
- Introducing technical training schemes for primary (mainly agriculture), secondary (factories/mills) and tertiary (tourism, banking and insurance) industries.

3. Planned Utilization of Natural Resources:

- Maximizing crop production.
- Improving the milk and meat yield of livestock.
- Comprehensive planning to improve fishing and mining industries; urgent steps for extracting huge mineral deposits in Balochistan.
- Implementing the concept of public-private sector partnership for a better exploitation and utility of natural resources.

Average Life Expectancy

Average number of years an individual is expected to live when they are born.

Decline in Death Rate/An Increase in Average Life Expectancy

Reasons

- More awareness about personal fitness through electronic media, especially social media since 2010
- Growth of fitness centres and health clubs, growing number of public parks in the suburban, planned housing schemes
- Safe drinking water and better quality food
- Improved preventive and curative medical care: vaccination schemes, more effective medicines, increased number of doctors and hospitals

- Improved standard of living in various segments of population.

Effects (advantages and disadvantages)

Advantages

- More experienced people hired by public and private sectors as consultants; retired people from the armed forces are preferred because of their better fitness.
- Elderly people give better advice to the young to manage domestic affairs
- Healthy grandparents are a better alternative to baby-sitters to look after babies in the absence of their parents, both husband and wife can go to their work places without any worries; they have special affection for their grandchildren
- Source of moral training for their children and grandchildren as well as to other people around them
- In traditional Muslim families, presence of elderly people is taken as a blessing of God

Disadvantages

- An increase in the old dependency ratio
- Extra spending on medical care of the elderly people creates economic difficulties for the family; special nursing care is needed for chronically ill and bed-ridden aged members of the family.
- Government has to give pension to the retired employees for many years; burden on the government resources
- Clash of ideas between grandparents and grandchildren over the changing social and cultural values----- the so called 'generation gap'

Population Movement:

1. Rural-Urban Migration:

It is determined by a combination of push and pull factors.

Push Factors (operating from rural side):

- Mechanization in agriculture: only a couple of workers needed to run the machinery; lesser manual labour required; so, the unemployed people migrate to cities.
- Poor crop yield due to floods, pests, e.g., leaf curl virus and drought; if the yield remains low for consecutive years, many rural families leave their villages.
- Over-grazing by animals causes soil erosion; this also reduces the yields.
- Uncultivable land due to water logging and salinity.
- High population growth causes large families; failure of land to satisfy the needs of such larger families; also not enough land for each heir.
- Subsistence farming methods fail to increase crop yield; due to increasing inflation, poverty increases and poor farmers are forced to migrate.
- Poor services: poor health care, lesser educational facilities, limited entertainment facilities and a poorly organised life style also push rural people to big cities.
- Limited variety of jobs in rural areas.

Pull Factors (operational from urban areas):

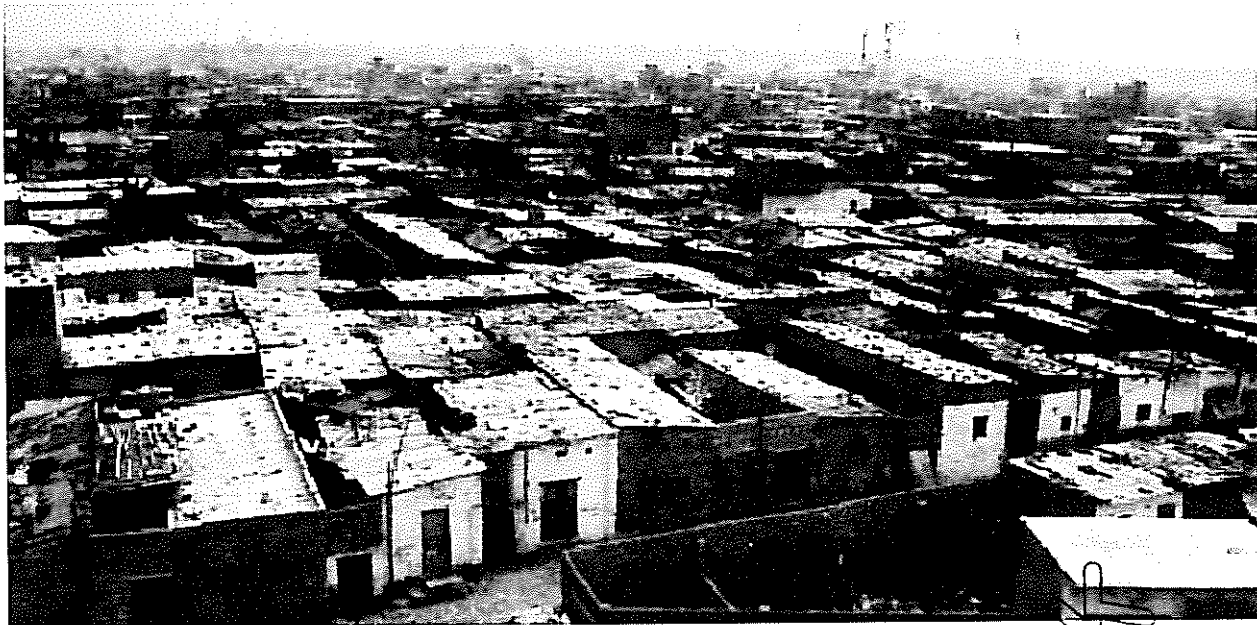
- Plenty of jobs in factory industry and tertiary sector: unskilled and skilled industrial workers, drivers, guards, assistants, hawkers to sell newspapers and commodities of daily life.
- Better paid jobs; expectation of improving the standard of living of the migrants.
- Better services: housing, schools, hospitals, parks and cinemas.

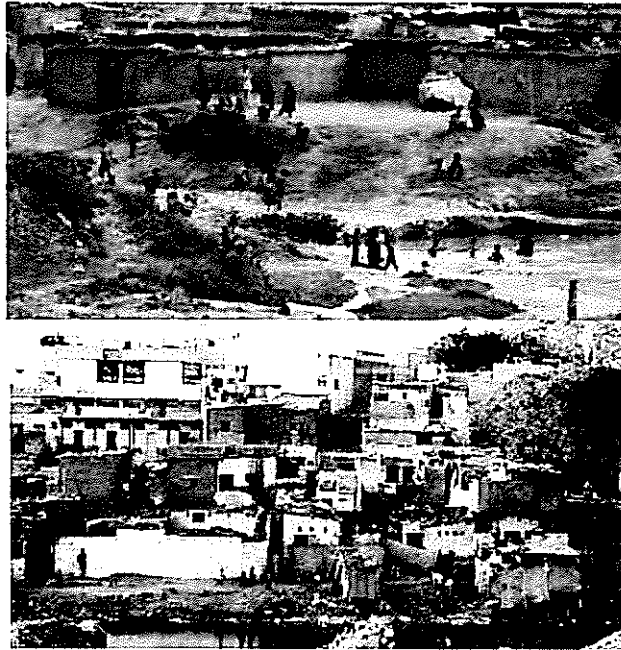
- More reliable sources of food and cheaper prices of various commodities.
- Glamour/bright lights factor: many rural people are attracted to the glamorous and busy lifestyle of big cities.

Effects/Problems Resulting from Rural-Urban Migration:-

1. Housing Problems:

- Rapid urbanization and higher population growth; unusual pressure on the housing sector in cities. This results in:
- Poor living conditions.
- More health hazards due to poor exposure to the sun, inadequate ventilation and congested living.
- The situation gets worse in slums and squatter settlements (Katchi Abadis) as many migrants are forced to live there.
- Katchi Abadis are unplanned, irregular and unregistered housing settlements that lack a proper layout and poorly built houses; they start cropping up in the outskirts of various cities and local powerful people occupy them to accommodate poor communities.





A general view of Katchi Abadis.

- More pressure on the civic agencies to provide basic amenities of life: gas and power supply, safe water supply and an effective sewerage system.
- Exploitation of the poor migrants by the owners of small sized housing units: expensive living.

2. Environmental Degradation and Pressure on Infrastructure:

- More pollution as more fuel is burned; firewood and animal dung is used as fuel by the dwellers of Katchi Abadis, and this adds to air pollution.
- Disposal of untreated solid waste by a greater number of people puts more pressure on the waste management authorities, e.g., WASA (Water And Sanitation Authority, Lahore); civic agencies fail to provide better healthcare, good quality education and transport services to an ever growing number of migrants.
- Migrants living in poor housing settlements are illiterate and negligent of hygienic living; they dispose waste more carelessly, often burning the domestic garbage, causing more air and land pollution.
- More emission of transport fuel due to a growing number of commuters/passengers; poor migrants often buy second-hand and poor quality vehicles which emit toxic gases in greater proportion.
- This increases air pollution in an alarming way; according to reliable sources, on the average, each vehicle in Pakistan emits 15-20 times more pollutants than the average vehicle in developed country.

3. Sprawling Growth of Cities:

- Continued population growth of major cities; new housing schemes in the suburbs; growth of Katchi Abadis in the suburban areas contribute to an unplanned expansion of cities in all directions.
- This is accompanied by illegal construction of houses and shops that are built by bribing the concerned authorities.
- Expanding cities start reaching the rural areas and thus forested and agricultural land is sacrificed.
- Management of such cities becomes difficult, and breeds corruption.

4. Growth of Anti-social Activities and Terrorism:

- Decreased job opportunities due to a growing number of migrants.
- A prolonged state of unemployment results in frustration and distress.
- Unemployed people tend to become drug addicts and vulnerable to criminal activities; criminal gangs and terrorist organizations pick such people easily and train them for criminal and terrorist activities such as kidnap for ransom and suicide bombing.

5. Psycho-Social Problems:

- Rural families are affected first as their male members migrate, leaving their families at the mercy of others.
- Partial loss of agricultural workforce and a gradual de-population of rural areas.
- Migrant families gradually get prone to psychological stress as a result of unemployment/job uncertainty, growing inflation and huge size of their family.
- Such frustrating elements lead to strained family relations and domestic violence, drug addiction and child abuse.
- The worst outcome of this vicious cycle is an increased rate of murder and suicide in major cities.

Solutions/Measures to Reduce Rural-Urban Migration:

- Creating awareness of the adverse consequences of rapid population growth and problems of living in major cities.
- Attaining a balance between resources and population by maximum utilization of natural and human resources.
- Promoting family planning methods to reduce birth rate.
- Conducting educational and training programs in rural and urban areas.
- Introducing rural uplift schemes such as rural electrification and construction of farm-to-market and farm-to-factory roads.
- Developing cottage and craft industry by providing loans and simple machinery.
- Promoting a culture of self-help schemes: usually a government sponsored scheme where members of a community are encouraged to improve their living conditions themselves.
- This involves: self-employment, growing their own food, improving their housing units and maintaining an effective water and sanitation system.
- Many NGOs (Non-Governmental Organizations) may also encourage some communities for the self-help schemes.

Named Projects for Rural Development

- AKRSP (Aga Khan Rural Support Program)
- NRSP/PSRP (National/Provincial Rural Support Program) and the Khushal Pakistan Project of 2000 onwards.
- Under these projects: construction and rehabilitation of farm-to-market and farm-to-factory roads.
- Technical and financial assistance by the SMEEDA (Small and Medium Enterprises Development Authority) to promote small industries.
- More recently, establishment of new institutes like TEVTA (Technical Education and Vocational Training Authority).

OUT-MIGRATION/OVERSEAS MIGRATION:

CAUSES:

- Reconstruction of Europe after the WW2 needed a huge workforce; honest and efficient Pakistani workers migrated on large scale 1950s onwards.
- 1970's onwards: the oil boom phenomenon and the resultant development projects in the Middle East; Pakistan provided cheap and efficient labour
- Relaxed immigration laws of UK and the Commonwealth states in the 1960s; immigration policies by various states like Canada, Australia and New Zealand since the 1980s due to an unusually low population growth of these countries.
- Better salaries/wages offered by the advanced economies of the West and the Middle Eastern states.
- Organized lifestyle without any injustice, corruption and cheating in most of the established economies; so, no unnecessary stress.
- Glamorized and fast lifestyle of the West in general and the USA in particular attracts a good number of Pakistanis.
- Political instability and uncertainty in Pakistan alongwith growing terrorism and violence in major cities like Karachi has forced many people to leave Pakistan.
- Business visa schemes of the USA and Canada offer more attraction to the rich Pakistanis.

Advantages of Out-migration:

- Foreign exchange remittances; government gets more funds for development schemes.
- Cultural ties between Pakistan and other states are strengthened.
- Flow of information and modern technology.
- Overseas Pakistanis invest with greater confidence and capital due to better earning.
- Pressure on employment providing bodies is relieved.

Disadvantages of Out-migration:

- Loss of highly educated people, talented class and technical workforce.
- Skilled and professionally trained people like doctors and engineers offer their services in other countries while such people are needed in Pakistan.
- Skilled workers are also needed in Pakistan to contribute to its development.
- Cultural and psycho-social problems for many overseas Pakistanis: clash of cultural values faced by their children as they grow up in the Western countries, difficulty to find a suitable match for the children.
- A recent wave of terrorism has created more problems for overseas Pakistanis; many discriminatory laws put them in a serious situation, e.g., ban on observance of Hijab in France is recent example.

Seasonal Migration in Pakistan:

- Common in some areas.
- Transhumance in the northern mountains: herdsman migrate with the flocks up to the cooler pastures and valleys in summers, and move to the plains in the cold winters.
- People from GB province and extreme north of Pakistan migrate to less cooler places in winters.
- Poor people from Punjab and Sindh migrate due to unpredictable and seasonal droughts; they migrate in search of water, food and jobs to big cities.
- Destruction of crops, livestock and mud houses by severe floods forces many rural communities of Punjab and Sindh living closer to the River Indus to migrate during

the rainy season July-September; flood victims also migrate temporarily to safer places.

- Poor people from nearby areas migrate in April-May to earn by participating in the harvesting of wheat in big farms of Punjab and Sindh; October-November they do the same for the harvesting of Kharif crops of cotton, rice and sugarcane.
- A seasonal workforce is needed for 3-4 months by sugar and cotton processing mills; such workers later migrate to other areas to get jobs.

Unemployment:

It is state of being unable to find a paid job.

Underemployment:

It applies to the persons not having enough paid work or not doing work that makes full use of their skills and abilities.

Overemployment:

It is a state of excessive employment in which the demand for labour in any sector of economy exceeds the available supply. In such a case the employees cannot reduce the time or the number of hours they spent earning an income.

Disguised Unemployment:

It refers to a condition where part of the labour force is either left without work or is working in a redundant manner where worker productivity is zero. For example, when productivity is low and too many workers are filling too few jobs.

Causes of unemployment:

- High rate of population growth and less jobs
- Demand of workers in agriculture sector is decreased due to mechanization/use of machinery in farms.
- Advanced information technology has lowered the demand for manual workers in various offices of urban areas.
- Less investment in economic activities e.g. industry, trade, farming etc.
- Mismatch between demand and supply of labour force due to the unavailability of skilled labour.
- Rural urban migration: migrants from rural areas compete with the urban settlers in finding a job, and this leads to unemployment.
- Political instability and frequent change in governments slow down the economic growth and industrial expansion; e.g., terrorism and violence in Karachi has created an unfavorable environment for employment opportunities; investors are reluctant to invest in the troubled cities.
- Pressure on productivity of land; failure of land to continue to feed an increasing number of family members of the farmers.
- Generally, a culture of over-spending among most of the rich Pakistanis; lesser savings and so, lesser funds with the government to start development schemes.

Effects of Unemployment:

- Due to a high population growth rate, average size of the family increases; since all members fail to get some job and inflation continues to increase, poverty increases.
- Due to an already high dependency ratio, unemployment results in a greater degree of physical and mental stress; this may lead to an increase in crime rate, domestic violence, drug addiction and even terrorist activities.

- Decreased purchasing power of the people due to a decrease in wages and salary; a decrease in demand of various products reduces the industrial output, thus slowing the pace of economic growth; due to a reduced industrial output, exports decline and this worsens an already negative BOP.
- Lesser amount of taxes collected by the government as a greater number of people fail to pay taxes due to lesser income; government has to raise the tax rate which leads to more economic difficulties of the people.
- Eventually the government is compelled to borrow from other countries and international fiscal bodies like the IMF (International Monetary Fund) and the WB (World Bank).
- Due to lack of funds with the government, local and foreign investors feel reluctant to invest in various schemes as they expect low returns and profits.
- Underutilization of human resources and lesser generation of funds lead to a low GDP and GNP growth rates.

Employment Generation Programmes Through Literacy and Training Schemes:

1. Training of Labour Force to Meet Rural Requirements:

- Pakistan's economy mainly depends on agriculture as it provides employment to about 42.10% of population.
- In order to meet requirements of agriculture sector labor force should be trained by these measures:
 - Establishment of training institutions where agriculture is taught as a basic subject along with the formal primary and secondary education.
 - Compulsory enrollment of young rural people to these institutions.
 - Attachment of these institutions to model farms for practical demonstration.
 - Establishment of workshops to train farmers about maximizing agricultural yield.
 - Offering technical training to people about repairing and maintaining agricultural machinery.
 - Establishment of training centres in rural areas for the development of cottage industries in order to provide enough employment opportunities to the rural population; introduction of micro finance schemes to help them buy simple machinery.

2. Training of labor force to meet Industrial Requirements

- The present industrial plants require a skilled labour force with a potential to work with changing production technology.
- Establishment of special training centres all over the country depending upon particular type of industries in different areas, e.g., TEVTA (Technical Education and Vocational Training Authority) is training thousands of job seekers.
- Such training programmes can deal with the following issues:
 - Specialized training according to the requirement of particular industries.
 - A good understanding of basic function of industrial plant.
 - Maintenance of plant and machinery.
 - Handling new, sophisticated machines through practical demonstration.
 - Regular in-service refresher courses for industrial workers.
 - Sending trainees abroad to centres of excellence in highly specialized/advanced techniques.
 - Training for managerial staff.

3. Training for Labour Force to Meet the Tertiary Sector Requirements:

- The tertiary sector employs about 33% of educated and trained labor force.
- This sector includes various services like health care, education, banking, insurance, transport, electricity supply, telephone, security etc. and has the greatest range of jobs as compared to the primary and secondary sectors.
- Pakistan needs skilled electricians, shop supervisors, trained teachers, doctors, bankers, insurance agents, accountants, executives and several other servicemen; self-employment schemes, such as 'Chief Minister's Rozgar Scheme' can help such people significantly; under these schemes the unemployed youth is provided auto rickshaws and taxis/cabs on soft term loans.
- Special training programs can be formulated after analyzing the requirements of each profession, e.g. training special guides for the tourism industry.

Sectors of Employment / Economy

- Primary: fishing, mining, forestry and agriculture; largest sector of economy but gradually shrinking mainly due to rural-urban migration, improved literacy and growth of secondary and tertiary sectors
- Secondary: large and small scale manufacturing and processing industries; least developed sector mainly due to power shortage crisis, political instability and lack of investment by various governments in large scale industries
- Tertiary: social and financial services, e.g., education, health, tourism, transport, banking and insurance; faster growth mainly because of availability of a huge range of jobs in this sector, and involvement of private sector on large scale; huge potential of development in tourism industry but neglected by the government, and affected by an increase in terrorism since the 1990s

Illiteracy

A literate person is the one who can read a letter to them in national language (Urdu) and put down their signature.

Reasons of illiteracy in Pakistan

- Poor spending on education by various governments since 1947; a huge chunk of budget is spent on defence (due to constant Indian threat) and debt repayment / repayment of loans to donor bodies and countries
- Poor working conditions in schools located in remote and under developed areas, e.g. southern Punjab, several parts of Sindh and KPK, and most of Balochistan; in many rural areas no school buildings; classes are held in the shade of trees
- High dropout rate (students leaving schools shortly after their enrolment) mainly due to poor conditions and the culture of corporal (physical) punishment by the poorly paid primary and secondary school teachers.
- The phenomenon of 'ghost schools': school buildings are available but no classes held and teachers keep drawing salaries in some parts of Pakistan; a massive crackdown was conducted against them in the late 1990s
- Lack of teacher training institutes for several decades; only recently some progress has been made in this regard.
- Rural communities show no interest in formal education as they prefer to keep their children engaged on their farms; opposition by parents and the religious community to female education in such areas.
- Expenses of uniform, stationery and transport are difficult to afford by the poor people as the government does not provide these.
- Lack of incentives for teachers appointed in rural areas

Effects

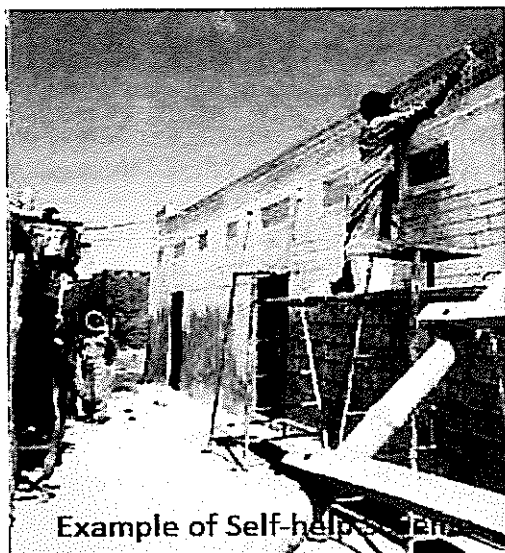
- Unemployment as an illiterate person has little job opportunities
- High birth rate as the illiterate couples do not understand the family planning schemes, use of contraceptives and benefits of keeping a small family, and space between births of children
- Rural to urban migration in order to get jobs; consequent adverse effects of this on both rural and urban areas
- Adverse psychological effects like frustration and disappointment; increased crime rate and domestic violence as a result of prolonged state of unemployment
- More chances of drug addiction and involvement in other anti-social activities especially influenced by watching movies and TV plays based on the theme of crime and punishment
- Government has to spend more to initiate adult education or technical education schemes for adult illiterate people

Measures to overcome illiteracy

- More budgetary spending on primary education; gradual implementation of compulsory and free primary education.
- More teacher training institutes, especially for females of rural areas
- Strict monitoring schools and teachers in remote and rural areas
- Better salaries and provision of security for teachers working in the under developed areas
- Support of rural religious community should be sought so that they encourage the people for sending their children, especially daughters, to schools
- Public-private partnership schemes should be launched to set up more primary and secondary schools
- Encouraging the NGOs (non-governmental organizations) like the Aga Khan Foundation, AKRSP (Aga Khan Rural Support Program), TCF (The Citizen Foundation) etc. should be encouraged by the government
- Public awareness schemes should be launched through radio and TV.
- Distance learning schemes should be introduced for primary classes by preparing a team of IT experts.

Self-Help Schemes

A self-help scheme is defined as a process in which people of an under-developed area voluntarily work together for collective welfare. They make a team to raise funds that are spent on maintenance of roads, clean water supply, better sewerage and sanitation. They also set up primary health care and education centres without depending on the government. Unfortunately, there are not many such schemes in Pakistan. However, those set up by philanthropic people have become a model for others to follow.



Example of Self-help Housing



- Examples: OPP (Orangi Pilot Project)/Orangi Welfare Project, Karachi, 1980 and Khuda Ki Basti (God's Town), Gadap Town, Karachi.

Advantages of the Self-help Schemes:

- Reduced poverty due to self-employment.
- Greater sense of responsibility to keep a cleaner and healthier environment; lesser dependence on the government.
- Gradually, the community may pressurize a government to improve water, gas and power supply to the area.
- Motivation among people to utilize skills of their community.
- Check on the intrusion of the unwanted people.
- More educational and small healthcare units may be set up by various NGOs.
- With an improved awareness about their health, the community members may build parks and playgrounds in their areas.
- By generating funds, small solar power units may be set up to get rid of the power shortage crisis.

Disadvantages/Limiting Factors:

- High prices of construction materials.
- Lesser savings with the low-income groups; lesser funds.
- Such projects take a lot of time and sometimes, are abandoned.
- Chances of corruption and mismanagement of funds further reduce chances of success.
- Shortage of dynamic and motivated leadership; differences among the community members slow down the pace of development.
- Lack of experienced and skilled people to manage such projects; generally, there are not many philanthropists such as Dr. Akhtar of the OPP (Orangi Pilot Project).
- More rural people are attracted to such settlements, seeing the availability of good services.
- Political instability and frequent change of governments adversely affect such projects.
- Growing violence, crime rate and terrorism in cities like Karachi, frustrate the sincere and motivated individuals and groups to accomplish such schemes.

Population Density:

It is the average number of people living per unit area/square km.

Population Distribution:

It refers to the pattern of the spread of people in an area.

Factors Affecting Population Density and Distribution:

1. Natural/Physical Factors:

- Type of land and soil: low density in rugged and desert areas; high density in plain areas with fertile soil.
- Climate: continental/semi arid climate of upper and lower Indus plains, maritime/humid climate of coastal areas have high population density; desert areas and most of south-western Balochistan have low population density due to unbearably hot summers; northern mountains have low density due to very harsh winters.
- Water and natural vegetation: areas of the IRS (Indus River System) and lakes in Punjab and Sindh have high density; deserts of Punjab, Sindh and Balochistan have low density; lush green valleys of Swat and neighbouring areas have relatively high density, whereas barren areas of the Indus Delta and most of south-western Balochistan have very low density.
- Natural routes: valley towns with mountain passes have high density, e.g., Peshawar, Bannu and Kohat; areas around high mountains of Safed Koh, Karakoram and Hindu Kush have low density.

2. Human factors:

- Social: better services, e.g., housing, education, healthcare, entertainment, transport and security; high density in urban areas and low density in rural areas; rural-urban migration causes more population in major towns and depopulation in small towns and villages.
- Economic: major cities have high density due to greater job opportunities in large scale industries and other sectors of economy; small towns and rural areas have low density due to lesser jobs; examples, most of Balochistan, Tribal Areas and GB province; efficient transport system, trade and business in major cities cause high density; lesser economic activity in rural areas causes low density; Murree and Galiat have high density due to tourism facilities but Tribal Areas and other mountainous regions have low density due to poor facilities; reclamation of desert land of Thal and Cholistan deserts has increased population density, but areas with a loss of land through deforestation, waterlogging and salinity and soil erosion have low density; the advanced port city of Karachi (and probably Gwadar in future) has very high density, but the Makran Coast has very low density.
- Political: new towns like Islamabad and the planned settlements in the outskirts of major cities have high density due to the priority given by the government; these have better facilities, more chances of jobs and a planned lifestyle.

Sustainable Population Growth:

It refers to a size of population that can be effectively supported by an economy's resources at all times. This means a controlled rate of population growth that does not strain the economic resources. It can be achieved by

- Developing resources in proportion to population growth so that a balance is attained between resources and population.

- Long term planning to control a high population growth.
- Creating awareness about the undesirable consequences of a high population growth.
- Implementing family planning programmes more effectively.

Question of Two Statements:

Statement A:

Rural-urban migration should be allowed to continue as it provides cheap labour in cities.

Statement B:

Government should discourage rural-urban migration by developing the rural areas.

Q: Which statement do you agree with more? Explain by referring to examples in Pakistan. [6]

Ans.

Migrants from rural areas offer services at cheaper rates and work more efficiently and honestly. However, their continuous influx into major cities causes serious problems that include unemployment, increased crime rate and growth of slums/Kachi Abadis. Pollution and health problems are also increased in cities. Therefore, steps should be taken for rural uplift schemes in order to discourage rural-urban migration. Rural electrification will not only improve the literacy rate, it will also stimulate cottage and craft industries. Interchanges along the Motorway have facilitated swift movement of agricultural and other products to cities. Better healthcare and educational facilities will motivate rural population to stay back in their native areas. Craftsmen should be given loans on easy terms to modernize their machinery and increase production. Agricultural training institutes should be set up in rural areas to train farmers to increase crop production. Electrically run tubewells will irrigate larger farms thus increasing the crop yield. Ultimately, the disparity between rural and urban areas will decrease and rural-urban migration will also be discouraged.

Past Paper Question:

Evaluate the measures taken to improve the living conditions in shanty developments in urban areas of Pakistan. Give reasons to support your judgement and refer to examples you have studied. You should consider different points of view in your answer. [6]

Ans.

Many shanty settlements have been improved either by the government or on the basis of self-help schemes such as Khuda Ki Basti and Orangi Pilot Project in Karachi. Usually the newly elected governments convert shanty towns into permanent settlements. Local governments also try to improve the condition of shanty towns. In self-help schemes, the residents develop a sense of responsibility by keeping their areas clean and maintain a healthy environment. Good ventilation and supply of safe water have reduced the chances of an outbreak of contagious diseases. However, the rate of success is poor mainly due to rural to urban migration. A high population growth rate in the families living in such areas makes it difficult for the government to provide funds for improving the shanty towns. This also increases illiteracy and spread of diseases. Rising inflation makes life more difficult for them. To conclude, the shanty towns can always be improved by the collaborative efforts of the government and various NGO's especially those run by fresh graduates from rich families.